

BRACONINE WASPS OF AUSTRALIA

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An illustrated key to the 45 genera of Braconinae known from Australia is provided. *Pycnobraconoides* gen.nov. (type species: *Ichneumon mutator* Fabricius) is described and illustrated. Thirteen new species are described and illustrated: *Acrocerilia tricolor* sp.nov. (Queensland); *Africadesha tobiasi* sp.nov. (Queensland); *Atanycolus australiensis* sp.nov. (Queensland); *Calcaribracon willani* sp.nov. (Queensland); *Furcadesha walteri* sp.nov. (Queensland); *Myosoma rufescens* sp.nov. (Queensland); *Pedinopleura australiensis* sp.nov. (Queensland); *Simplicibracon nigratarsus* sp.nov. (Queensland); *Testudobracon australicolorus* sp.nov. (Queensland); *Testudobracon tatyanae* sp.nov. (Queensland); *Testudobracon unicolorus* sp.nov. (Queensland); *Trigastrotheca tricolor* sp.nov. (Queensland) and *Virgulibracon endoxylaphagus* sp.nov. (Queensland). *Poecilobracon* Cameron is treated as junior synonym of *Calibracon* Ashmead. *Bracon froggatti* Cameron is transferred to *Pycnobraconoides* gen.nov. Nine genera are recorded from Australia for the first time: *Acrocerilia* van Achterberg; *Africadesha* Quicke, *Atanycolus* Foerster, *Furcadesha* Quicke, *Gelasinibracon* Quicke, *Paranesaulax* Quicke, *Rostraulax* Quicke, *Trigastrotheca* Cameron and *Vipiomorpha* Tobias. *Calcaribracon diores* (Cameron) is recorded from Australia for the first time. Notes are provided on the distributions and biologies (when known) of all the genera. □ *Hymenoptera, Braconidae, Braconinae, wasp, parasite, Australia, key, new genera, new species, synonymy.*

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The Braconinae is a huge, cosmopolitan subfamily of parasitic wasps with nearly 5000 described species (Shenefelt, 1978) distributed among more than 200 genera worldwide. The vast majority of species are ectoparasitoids principally on coleopterous and lepidopterous hosts though a few attack Diptera, Hymenoptera-Symphyta and possibly Homoptera and one group, the Aspidobraconina, are endoparasitic on butterfly pupae.

Only a minority of extant species have been described and there are also undoubtedly numerous new genera awaiting discovery, the Australian fauna of braconine wasps being particularly poorly known. The last generic key dealing specifically with Australia is that of Szépligeti (1906) which included 10 genera. More recently, Parrott (1953) catalogued the Australian Braconinae listing 12 genera compared with the 45 now known to occur there. More Australian species can be identified to genus with the key to the Old World genera provided by Quicke (1987b). However, since that time, several new Australian genera have been described (Quicke, 1988e, 1989d; Quicke & Tobias, 1990) and it is therefore thought that the presentation of an illustrated key to the Australian genera would be both timely and

would encourage much needed investigation of Australian braconine wasp biology.

TERMINOLOGY AND COLLECTIONS

Terminology follows that of van Achterberg (1979, 1988). Wing veins are measured from the centres of their junctions (except for forewing vein r and where otherwise stated), length of head is measured perpendicular to the face (re: couplet 34), length of femur excludes trochantellus and ovipositor length refers to that part which would normally project beyond the apex of the metasoma when directed posteriorly as in most set specimens.

Abbreviations for museums are: American Entomological Institute, Gainesville (AEIG); Australian Museum, Sydney (AMSA); Australian National Insect Collection, Canberra (ANIC); Hungarian Natural History Museum, Budapest (HNHM); Natural History Museum, London (BMNH); Queensland Department of Primary Industries, Indooroopilly, Brisbane (QDPI); Queensland Museum, South Brisbane (QMBA); Quicke Collection, Sheffield (QC).

KEY TO THE GENERA AND SUBGENERA OF AUSTRALIAN BRACONINAE (♀ ♀ ONLY)

The following key is arranged so as to obtain reasonably quick identification of Australian genera and thus the first key character is chosen so as to divide the known genera into two, roughly equal-sized groups. By reference to Figures 27-35 the shape of the scapus of the great majority of specimens encountered should be unambiguously assignable to one category or the other. The few genera with species showing variation or intermediate conditions (notably in the Aphrastobraconina, viz *Cedilla*, *Curriea*, *Ligulibracon*, *Megalommum* and *Undabracon* and especially *Eucurriea*) are allowed for by a loop. To assist further with use of couplet 1, and to help allow for specimens in which both antennae are missing, a list of unique characters for genera and groups is provided in Table 1.

1. Scapus shorter ventrally than dorsally in lateral aspect when directed anteriorly, usually small (Figs 27, 28, 31, 47, 48, 75, 76, 81, 85), not emarginate medially (Fig. 47) and at most only weakly emarginate laterally (Figs 31, 47) (see Table 1 in case of uncertainty) 2
 - Scapus at least as long or longer ventrally than dorsally in lateral aspect when directed anteriorly, often cylindrical and large (Figs 32-35, 39, 44, 80), usually with well-developed apico-medial and apico-lateral emarginations 32
2. Forewing vein CU1a arising at the same level as 2-CU, vein CU1b much longer than 3CU-1 if the latter is distinct (Fig. 12) (*Adeshini*) 3
 - Forewing vein CU1a arising well below the level of 2-CU, vein 3CU-1 at least as long as and usually much longer than vein CU1b (Figs 13, 15-19, 94-100) 4
3. Posterior margin of 5th metasomal tergite strongly produced on either side of the midline (Figs 110, 111) *Furcadesha*
 - Posterior margin of 5th metasomal tergite not produced sub-medially *Africadesha*
4. First metasomal tergite fused to metasomal syntergite 2+3, the junction between tergites 1 and 2 being represented by a crenulate sulcus (Figs 74, 121) (*Aspidobraconina*) 5
 - First metasomal tergite movable joined to metasomal syntergite 2+3, there being a normal arthrodial intersegmental membrane between tergites 1 and 2 (Figs 59-71) 6
5. Median area of metanotum with a complete mid-longitudinal carina; dorsal carinae of 1st metasomal

- tergite running separately to posterior margin of tergite; base of hindwing with a glabrous area; median lobe of mesoscutum with a pair of sub-medial, longitudinal grooves anteriorly; 6th tergite with relatively shallow peri-basal, transverse groove (Fig. 121) *Pedinopleura*
- Median area of metanotum without a complete carina (Fig. 105); dorsal carinae of 1st metasomal tergite uniting mid-posteriorly well before posterior margin of tergite (Fig. 74); base of hindwing more or less evenly setose; median lobe of mesoscutum without sub-medial longitudinal grooves anteriorly; 6th tergite with deep peri-basal, transverse groove (Fig. 115) *Hyboteles*
- 6. Propodeum with a complete, lamelliform mid-longitudinal carina (see Fig. 105) 7
 - Propodeum without a complete lamelliform mid-longitudinal carina or with only a short one posteriorly 12
- 7. Posterior margin of 6th metasomal tergite with a (usually) deep, narrow, semicircular, medial emargination (Figs 117, 118, 120) and (usually) tergites 3-5 distinctly roundly produced laterally (Figs 116, 119); metasomal syntergite 2+3 wider than long; ovipositor as long as or longer than the metasoma *Testudobracon*
 - Posterior margin of 6th metasomal tergite not narrowly emarginate medially nor roundly produced laterally (Fig. 113); metasomal syntergite 2+3 longer than wide (Figs 71, 73); ovipositor usually shorter than half the metasoma 8
- 8. Posterior margin of 6th metasomal tergite with a pair of submedian emarginations leaving a sharp median prominence (Figs 112, 113) *Trigastrotrothea*

Character	State	Go to key couplet
Scapus	petiolate, strongly or angularly narrowed at base with concave basal profile (Fig 44)	40
Propodeum	with a complete, mid-longitudinal (usually lamelliform) carina (Fig 105)	2
Forewing vein 3-CU1	absent or much shorter than vein CU1b (Figs 12, 89)	3
Forewing veins CU1b	much wider than posterior part of vein 3CU1 (Figs 21, 22, 94)	32
Claws	bifurcate (Figs 57, 58)	42
Basal lobe of claw	pointed or with small accessory tooth (Figs 52-54)	2
1st metasomal tergite	fused immovably to 2nd (Fig 74)	5

TABLE 1. Characters characterizing and unique to genera or groups of genera and key couplet to proceed from to complete identification

- Posterior margin of 6th metasomal tergite without submedial emarginations nor with a median prominence 9
- 9. Base of hindwing with a large glabrous area distal to, and approximately the same size as, the sub-basal cell; scutellum with a well-developed pit medio-anteriorly; forewing vein r-m with only a single posterior bulla; forewing 2nd submarginal cell virtually parallel-sided, veins 3-SR and 2-M not noticeably converging distally *Acrocerilia*
- Base of hindwing more or less evenly densely setose with at most only a small glabrous area around vein 2-1A; scutellum without a medio-anterior pit; forewing vein r-m variable but often with a distinct bulla and associated flexion line anteriorly as well as posteriorly; forewing 2nd submarginal cell narrowing distally 10
- 10. Hindwing vein 2-SC+R transverse (Fig. 102); ovipositor (part extending beyond apex of metasoma) longer than the median length of the 2nd metasomal tergite; transverse median clypeal carina strongly protruding (Fig. 76) *Simplicibracon*
- Hindwing vein 2-SC+R longitudinal (Fig. 101); ovipositor (part extending beyond apex of metasoma) shorter than median length of 2nd metasomal tergite; transverse median clypeal carina less strongly protruding 11
- 11. Precoxal suture represented by a deep, smooth, medial, circular pit; 2nd metasomal suture interrupted medially at least by a strong ridge, usually by a wider area (Figs 71, 73); median area of metanotum with a complete mid-longitudinal carina *Gelasinibracon*
- Precoxal suture represented by an elongate distinctly sculptured impression; 2nd metasomal suture not interrupted medially; median area of metanotum bulbous, without a complete mid-longitudinal carina *Esengoides*
- 12. Basal lobes of claws at least angularly narrowing before the claw (Figs 53, 54), sometimes produced into a distinct tooth-like process (Fig. 52) 13
- Basal lobe of claws smoothly curved (Figs 55-57) 20
- 13. Hindwing with at least a pigmented line representing vein 3-CU (Fig. 14; separated from remainder of venation); basal lobe of claws produced into a tooth-like process (Fig. 52) 14
- Hindwing without vein 3-CU (Figs 15-19); basal lobe of claws angularly narrowed, but not toothed (Figs 53, 54) 15
- 14. Labio-maxillary complex elongate; hindwing vein 2-SC+R strongly transverse (Fig. 14) *Calcaribracon* (*Calcaribracon*)
- Labio-maxillary complex normal; hindwing vein 2-SC+R interstitial or longitudinal (see Fig. 101) *Calcaribracon* (*Arostrobracon*)
- 15. Shortest distance between 1st discal cell and 2nd submarginal cell of forewing at least 0.85 times shortest distance between 1st submarginal and 3rd submarginal cell (Fig. 15) *Tropobracon*
- Shortest distance between 1st discal cell and 2nd submarginal cell not more than 0.7 times shortest distance between 1st and 3rd submarginal cells (Figs 16, 17, 87, 89) 16
- 16. Marginal cell of forewing short, vein SR1 reaching wing margin less than 0.65 times the distance between the apex of the pterostigma and the wing tip (Fig. 16); propodeum largely sculptured *Vipiomorpha*
- Marginal cell of forewing longer, vein SR1 reaching wing margin more than 0.8 times the distance between the apex of the pterostigma and the wingtip (Figs 17-19); propodeum often smooth 17
- 17. First metasomal tergite very slender, more than 3.0 times longer than maximally wide (Fig. 70); forewing vein 1-SR+M straight or virtually so; metasoma completely smooth and shiny *Myosoma*
- First metasomal tergite less than 2.5 times longer than maximally wide (see Figs 65-67); forewing vein 1-SR+M straight or curved; metasoma variably sculptured 18
- 18. Forewing vein 1-SR+M strongly curved posteriorly after arising from vein 1-SR (Fig. 17; see also Fig. 91); median flagellomeres shorter than wide; metasoma completely smooth and shiny *Mollibracon*
- Forewing vein 1-SR+M straight or weakly curved (see Figs 12, 13) or if strongly curved (some *Bracon* spp.) then the median flagellomeres are distinctly longer than wide; metasoma variably sculptured 19
- 19. Forewing vein 3-SR more than 1.6 times longer than vein r, usually more than 1.9 times longer (see Figs 87, 88); forewing vein r more or less straight (see Fig. 88) *Bracon* (part)
- Forewing vein 3-SR less than 1.5 times longer than vein r, usually less than 1.2 times (Fig. 86); forewing vein r usually rather sinuous (Fig. 86) *Habrobracon*
- 20. Middle of clypeus strongly produced to form a massive beak-like process (Figs 9, 10) *Psittacibracon*
- Middle of clypeus at most with a lamelliform carina (Fig. 75) 21
- 21. Forewing vein CU1b much wider anteriorly than posterior part of vein 3-CU1 (Figs 21, 22, 94), 1st subdiscal cell being more or less strongly ovoid

- or petiolate (Figs 21, 22, 94) (*Aphrastobraconina* part)33
- Forewing vein CUIb not or hardly wider than posterior part of vein 3-CUI (Figs 95-100), 1st subdiscal cell not ovoid or petiolate22
22. Pedicellus large, highly petiolate, medially protruding and with a large but discrete patch of specialized sensillae (Fig. 85); fore tibia with a longitudinal row of thickened, peg-like setae (Fig. 83)*Serratobracon*
- Pedicellus normal-sized, not petiolate and without a patch of specialised sensillae (if with sensillae then these not restricted to one side of pedicellus) (see Figs 27, 28, 31); fore tibia without a longitudinal row of thickened, peg-like setae23
23. With a strong spur arising from forewing vein 3-CUI (Fig. 100); transverse median clypeal carina strongly protruding (Fig. 75); forewing vein 1-SR+M moderately curved, not sharply angled (see Figs 21, 26)*Ploceibracon*
- Forewing vein 3-CUI usually without a spur (see Figs 96-99) or if with a spur (e.g. some *Virgulibracon*) then transverse median clypeal carina not strongly produced (see Figs 44-48) and/or forewing vein 1-SR+M sharply angled (Figs 90, 92)24
24. Ovipositor without a pre-apical dorsal notch or nodus (Figs 128, 130, 131)25
- Ovipositor with a distinct pre-apical dorsal notch or nodus (see Figs 133-138)27
25. Ovipositor very short, thick and laterally compressed (Fig. 131), the exerted part shorter than metasomal syntergite 2+3; all metasomal tergites largely smooth and shiny*Stigmatobracon*
- Ovipositor longer and more slender (Figs 128, 130), the exerted part longer than metasomal syntergite 2+3; at least basal 2 metasomal tergites largely coarsely sculptured (Fig. 67)26
26. First metasomal tergite with a well-developed mid-longitudinal carina (Fig. 67); ovipositor gradually and more or less evenly narrowing from base to apex (Fig. 128); eyes virtually glabrous*Hybogaster*
- First metasomal tergite without a mid-longitudinal carina; ovipositor distinctly deepening pre-apically (Fig. 130); eyes usually setose*Pycnobraconoides* gen. nov.
27. Forewing vein 1-SR+M sharply and strongly angled posteriorly approximately one third of the distance from its base (Figs 19, 90, 92), often with a distinct spur arising from the angulation (Fig. 92)28
- Forewing vein 1-SR+M straight or gently and more or less evenly curved posteriorly (see Figs 87, 91, 94, 97), without a spur30
28. First metasomal tergite with dorsal carina joining dorso-lateral carina (Figs 66, 108); second metasomal tergite with a large well-developed mid-basal, posteriorly narrowing, triangular area (Fig. 66); 3rd metasomal tergite with well-developed antero-lateral, posteriorly diverging grooves; hindwing with a glabrous area distal to vein 1r-m*Vomeribracon*
- First metasomal tergite without dorsal or dorso-lateral carinae (Fig. 65); second metasomal tergite without a posteriorly narrowing, mid-basal triangular area, sometimes with a pair of posteriorly diverging grooves (Fig. 65); 3rd metasomal tergite without, or with only weak, antero-lateral grooves29
29. Forewing vein r-m with only one bulla (posterior one); antero-lateral areas of 2nd metasomal tergite membranous, unsclerotized .. *Virgulibracon*
- Forewing vein r-m with two bullae; antero-lateral areas of 2nd metasomal tergite distinctly sclerotized*Virgulibraconoides*
30. Forewing cu-a interstitial or virtually so (see Figs 97-100), lower part of clypeus sharply recessed into the hypoclypeal depression (see Figs 41-43, 47); ovipositor less than 2.5 times longer than forewing; forewing veins C+SC+R and 1-SR forming an angle of more than 50°; base of hindwing usually evenly setose*Bracon* (part)
- Forewing vein cu-a postfurcal, removed from vein 1-M by more than the width of a vein (Figs 20, 96), lower part of clypeus hardly recessed into hypoclypeal depression, the hypoclypeal hair brushes orientated more or less anteriorly (Fig. 48); ovipositor more than 3.5 times longer than the forewing; forewing veins C+SC+R and 1-SR forming an angle of less than 50°; base of hindwing with a large glabrous area31
31. Hindwing vein 1r-m longer than vein SC+R1 (Fig. 20)*Eurobracon*
- Hindwing vein 1r-m shorter than SC+R1 (see Figs 101, 102)*Eurobraconoides*
32. Forewing vein 3-CUI (usually) narrowing posteriorly where it is narrower than the anteriorly thickened vein CUIb (Figs 21, 22, 94); 1st subdiscal cell with a medio-distal glabrous area (Figs 21, 22, 25); forewing vein 2-1A often markedly curved or angled (Fig. 94) (*Aphrastobraconina*)33
- Forewing vein 3-CUI not markedly narrowed posteriorly and not narrower than vein CUIb (Figs 97-99); 1st subdiscal cell usually evenly setose; forewing vein 2-1A not strongly curved or angled (see Figs 97-99)34
33. Ovipositor formed into 3 arch-like sections poste-

- riorly (Fig. 125); base of hindwing evenly setose *Undabracou*
- Ovipositor at most formed into a single distal arch (Figs 123, 124, 126); base of hindwing with a large glabrous area34
34. Ovipositor formed into a single distal arch (Figs 123, 124); fore wing vein r-m with a single posterior bulla (Figs 21, 88)35
- Ovipositor not formed into an arch distally (Fig. 126); forewing vein r-m with two bulli (see Fig. 20) or largely unsclerotized (Fig. 22)36
35. Ovipositor arch shallow, occupying approximately 0.3 of the exerted length of the ovipositor, base of arch indicated by angular expansion of the lower valves (Fig. 123); labio-maxillary complex somewhat elongate *Ligulibracon*
- Ovipositor arch deep, occupying less than 0.2 of the exerted length of the ovipositor, without angular basal projections of the lower valves (Fig. 124); labio-maxillary complex not elongate *Cedilla*
36. Width of head (across eyes)/length of head less than 1.48; face with coarse foveate to rugose sculpture (Fig. 41)37
- Width of head (across eyes)/length of head more than 1.50; face shiny, smooth with scattered punctures (Fig. 43) *Eucurria*
37. Length of forewing vein 3-SR less than 1.65 times length of m-cu (Fig. 25); 1st tergite with weak dorso-lateral carinae *Vipiellus* (part)
- Length of forewing vein 3-SR more than 1.7 times length of m-cu (Fig. 22); 1st tergite with or without dorso-lateral carinae38
38. First metasomal tergite without dorso-lateral carinae (Fig. 61) *Megalounum*
- First metasomal tergite with at least a trace of dorso-lateral carinae (see Figs 60, 66, 67) *Curria*
39. Scapus angularly narrowed basally (petiolate), with a broad preapical concave ledge (Figs 34-36, 39, 80); only ever with one specialized bristle at apex of hindwing vein C+SC+R (Figs 51, 103); pedicellus petiolate, strongly protruding medially with area of specialized sculpture (Figs 34, 35, 37, 38, 80)40
- Scapus not angularly narrowed basally, without such a broad preapical ledge (Figs 29, 32); often with more than one especially thickened seta at apex of hind wing vein C+SC+R (Figs 49, 50); pedicellus more or less parallel-sided or distally narrowing, at most only slightly narrowed basally, not produced medially (Figs 29, 32, 33)42
40. Face with a well-developed, transverse, protruding plate (Figs 39, 40, 44); apico-ventral setae of penultimate tarsal article very long, more than 0.8 times ventral length of telotarsus41
- Face without a plate-like projection (Fig. 77); apico-ventral setae of penultimate tarsal articles much shorter, not more than 0.5 times ventral length of telotarsus (see Figs 53, 55) *Atanycolus*
41. Face with a horn-like, apically truncate projection medially arising from the base of the plate-like projection (Fig. 40) *Chaoilta* (*Blastomorpha*)
- Face at most with a mid-longitudinal, lamelliform carina above the plate-like projection (Fig. 39) *Chaoilta* (*Chaoilta*)
42. Claws bifurcate (Figs 57, 58) *Macrobracon*
- Claws simple (Figs 55, 56)43
43. Length of 1st subdiscal cell (parallel to vein 2-CU1) more than twice width of cell (perpendicular to vein 2-CU1) (Figs 23, 97); forewing vein r-m short, almost entirely unsclerotized, not tubular, without distinct bullae (Fig. 23); ovipositor with at least a weak pre-apical dorsal notch or nodus (Figs 135, 136) *Eumesaulax*
- 1st subdiscal cell less than 1.9 times longer than wide (Fig. 25) or if shorter then either forewing vein r-m longer, largely sclerotized and tubular, often with 1 or 2 distinct bullae (see Figs 20-22, 24-26), or ovipositor without a pre-apical dorsal notch or nodus (Figs 127-132)44
44. Forewing vein 1-SR+M distinctly curving towards the anterior wing margin after arising from 1-SR (Fig. 93; see also Fig. 16); angle between veins 1-SR and C+SC+R less than 50°; forewing vein r more than 0.69 times length of m-cu *Stenobracon*
- Forewing vein 1-SR+M usually distinctly curved posteriorly after arising from 1-SR (see Figs 19-26, 90, 97) or if more or less straight then angle between veins 1-SR and C+SC+R more than 55° and/or vein r less than 0.65 times length of vein m-cu45
45. Ovipositor (part extending beyond apex of metasoma) more than twice length of forewing46
- Ovipositor (part extending beyond apex of metasoma) less than 1.4 times length of forewing47
46. Apex of ovipositor smoothly expanded but without a pre-apical dorsal nodus or apicoventral serrations (Fig. 127); 2nd metasomal tergite smooth (Fig. 106); 3rd metasomal tergite with a medially broken, transverse median groove or a pair of broader depressions (Fig. 106), otherwise smooth and shiny; labio-maxillary complex not elongate; posterior margin of propodeum simple, without carinae *Paranesaulax*
- Apex of ovipositor with a distinct pre-apical dorsal nodus and ventral serrations; 2nd metasomal tergite coarsely sculptured (Fig. 104); 3rd metasoma

- mal tergite without a transverse median groove, largely sculptured; labio-maxillary complex moderately elongate; posterior margin of propodeum with one or more pairs of short, anteriorly diverging carinae *Rostraulax*
47. Ovipositor without a pre-apical dorsal notch or nodus (Fig. 129, also see Fig. 128) 48
- Ovipositor with a pre-apical dorsal notch or nodus (see Figs 133, 134) 49
48. 2nd metasomal tergite with a posteriorly narrowing, mid-basal raised triangular area (see Fig. 60); forewing vein 3-SR less than 1.9 times length of r-m (Fig. 25); posterior margins of metasomal tergites 3-5 membranous, without transverse subposterior grooves *Vipiellus* (part)
- 2nd metasomal tergite without a posteriorly narrowing, mid-basal triangular area (Fig. 63); forewing vein 3-SR more than twice length of r-m; posterior margins of metasomal tergites 3-5 sclerotized and convex in lateral profile and with transverse subposterior groove *Iphiaulax*
49. Metasoma short, robust and strongly sculptured (Fig. 62); 3rd metasomal tergite more than 3.75 times wider than minimally long. *Campyloneurus*
- Metasoma moderately elongate and largely smooth and shiny (Fig. 64); 3rd metasomal tergite less than 2.25 times wider than minimally long *Callibracon*

NOTES ON THE AUSTRALIAN GENERA INCLUDING DESCRIPTIONS OF A NEW GENUS AND NEW SPECIES

New records for genera occurring in Australia are indicated by an asterix. Full details of synonymy are given in Shenefelt (1978), Quicke (1987b, 1991a) and Quicke & van Achterberg (1990).

**Acrocerilia* van Achterberg

Previously known only from the type species, *A. pachynervis* van Achterberg, from the Philippines where it has been reared from the gracilariid cocoa moth, *Acrocercops cramerella* Snellen. The biological details available for this species indicate that it emerges from the prepupa of its host and therefore van Achterberg (1989) cautiously suggested that it might in fact be an endoparasitoid though precise data are lacking. In terms of its relationships, *Acrocerilia* appears intermediate in structure between certain genera of the *Plesiobracon* group, in particular *Psilolobus* van Achterberg and *Simplicibracon* Quicke, and members of the *Aspidobraconina*

(see *Hyboteles* van Achterberg and *Pedinopleura* van Achterberg). If an association with the *Aspidobraconina* which are endoparasitoids of butterfly pupae is proven then this would add some support to the possibility that *Acrocerilia* might also be endoparasitic.

Key to species of *Acrocerilia*

1. Top of head coriaceous; head black and white; metasoma dorsally black with a white margin; hindwing vein 1-M narrowing distally *A. tricolor* sp. nov.
- Top of head smooth; head brownish yellow; metasoma entirely brownish yellow; hindwing vein 1-M uniformly broad along its whole length *A. pachynervis* van Achterberg

Acrocerilia tricolor sp. nov.

MATERIAL EXAMINED

HOLOTYPE: ♂ labelled: 'AUSTRALIA NE Queensland Conway Range Nat. Park E from Proserpine' and 'No. 226, 22.II.1981 leg. Hangay and Vojnits at light'. Deposited in QMBA.

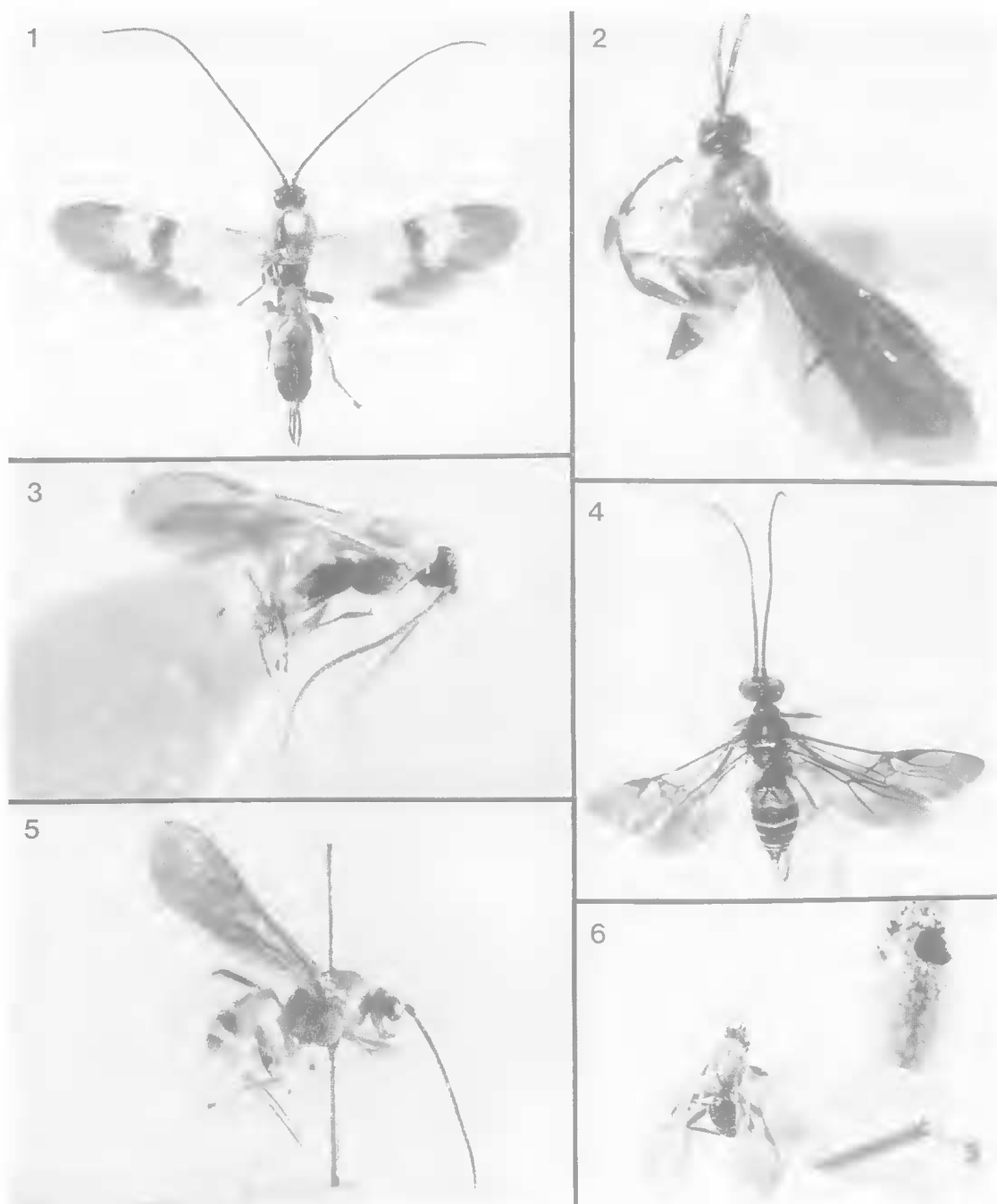
PARATYPE: ♂ labelled: 'AUSTRALIA NE Queensland Conway Range Nat. Park E from Proserpine' and '18.II.1981 No. 177 leg. Hangay and Vojnits, at light'. HNHM.

DESCRIPTION (♂ ♂)

Length of body 4.4-5.0mm, of forewing 4.0-4.5mm and of antenna 4.6-5.0mm.

Antennae with 43-44 flagellomeres. Terminal flagellomere acuminate. First flagellomere 1.07 and 1.15 times longer than the 2nd and 3rd respectively, the latter being 1.5 times longer than wide. Height of clypeus: inter-tentorial distance: tentorio-ocular distance = 1.0: 3.8: 2.9. Height of eye: shortest distance between cycs: width of head = 1.0: 1.29: 2.37. Width of face: height of face = 2.05: 1.0. Face except for supra clypeal triangle densely, finely punctate, the punctures being arranged in transverse rows giving the face a striate appearance. Eyes virtually glabrous. Frons, temples and occiput coriaceous, back of head becoming finely striate. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.25: 1.0: 2.25. Horizontal length of eye: horizontal length of head behind eye = 2.85: 1.0.

Mesosoma 1.48 times longer than maximally high. Pronotum with crenulate groove laterally. Notauli moderately well-developed on anterior



FIGS 1-6. 1. *Stigmatobracon diversipennis* Turner, ♀. 2. *Myosoma rufescens* sp.nov., ♂ paratype. 3. *Trigastrotrothea tricolor* sp.nov., ♀ paratype. 4. *Virgulibraconoides* sp., ♀. 5. *Simplicibracon nigratarsus* sp.nov., ♀ holotype. 6. *Pycnobraconoides mutator* (Fabricius) comb. nov., ♀ and host cocoon with parasitoid's emergence hole.

half of mesoscutum, absent on posterior half. Scutellar sulcus with 5 transverse crenulae. Mesoscutum, scutellum, mesopleuron and mesosternum densely and evenly setose, punctulate. Precoxal suture indicated by a weak depression. Mesopleural suture punctate. Median area of metanotum with a short carina anteriorly; merging with a flat triangular plate posteriorly in one specimen. Propodeum with a complete mid-longitudinal carina bordered by crenulae; posterior margin with numerous strong crenulations merging into rugose sculpture on the posterior half of the propodeum.

Forewing. Pterostigma 2.8 times longer than maximally wide. Lengths of veins SR1: 3-SR:r = 5.0: 1.6: 1.0. Lengths of veins 2- SR:3-SR:r-m = 1.36:1.36:1.0. Vein 2-M curved. Vein 1-M straight. Vein 1-SR forming an angle of approximately 80°. Veins cu-a more or less interstitial.

Hindwing. Vein 1r-m 0.35 times length of SC+R1. Apex of C+SC+R with one especially thickened bristle. Vein 2-1A absent. Base of discal + subdiscal cell with a large glabrous area.

Lengths of fore femur: tibia: tarsus = 1.0: 1.13: 1.20. Lengths of hind femur: tibia: basitarsus = 2.0: 2.7: 1.0. Hind tibia slender, maximally deep at apex. Hind basitarsus 5 times long than deep.

Metasomal tergites 1-5 largely foveate-rugose. Second tergite 2.0 times wider than medially long. Second suture crenulate, moderately curved. Tergites 3-5 with well-developed, antero-lateral areas. Posterior margin of 5th tergite slightly irregular.

Head ivory-white except for tips of mandibles, a triangular mark above the clypeus and the frons, temples, occiput and back of head down to level of base of eye which are black. Mesosoma brownish orange except for propodeum which is largely piceous. Fore and middle legs brownish orange, hind legs piceous to black. Metasomal tergites black except for the following which are ivory-white: the base and lateral margins (broadly) of the 1st tergite, the lateral margins of tergites 1-5 (narrowly) and their antero-lateral triangular areas, and the posterior margin of the 5th tergite. Wings uniformly very pale brown with dark brown pterostigma and venation.

**Africadesha* Quicke

Members of the Adeshini, these small wasps have wing lengths less than 3mm. *Africadesha* is previously known from a single Afrotropical species, *A. usherwoodi* Quicke, though several other undescribed Afrotropical species have been seen

by the senior author. Despite the strange disjunct distribution indicated by the discovery of the new Australian species, the two species differ only in relatively small characters and there is no reason to doubt the two as being anything other than congeneric. Nothing is known of the biology of any of the Adeshini. Further, given their small size, it is quite likely that members of other genera of this tribe will be found in Australia and the reader is referred to van Achterberg (1983a) and Quicke (1986b, 1988f).

Key to species of *Africadesha*

1. First metasomal tergite more than 1.5 times longer than posteriorly wide; third metasomal tergite with well-developed longitudinally striate sculpture (Fig. 109) *A. tobiasi* sp. nov.
- First metasomal tergite less than 1.4 times longer than posteriorly wide; third metasomal tergite without longitudinally striate sculpture
..... *A. usherwoodi* Quicke

Africadesha tobiasi sp. nov.

(Figs 12, 109, 134)

MATERIAL EXAMINED

HOLOTYPE: ♀ labelled: '15 km NE Kuranda, Queensland, 1.V-14.VI. 1985 MDPI FIT site 25, Storey & Halfpapp', Deposited in QMBA.

PARATYPES: 3 ♀ ♀, same data as holotype. QMBA, QDPI and BMNH.

DESCRIPTION (♀ ♀)

Length of body 2.7mm, of forewing 2.6mm, of ovipositor (part exerted beyond apex of metasoma) 0.45mm and of antenna 4.2mm.

Antenna with 42 flagellomeres, considerably longer than the body. Terminal flagellomere pointed but not acuminate, 2.3 times longer than wide. Median flagellomeres 1.7 times longer than wide. First flagellomere 1.17 and 1.4 times longer than the 2nd and 3rd flagellomeres respectively, the latter being 2.25 times longer than wide. Height of clypeus: inter-tentorial distance: tentorio-ocular distance = 1.0:2.8:2.2. Face, frons and occiput coriaceous. Height of eye: shortest distance between eyes: width of head = 1.0:1.375:2.5. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.5:1.0:3.5.

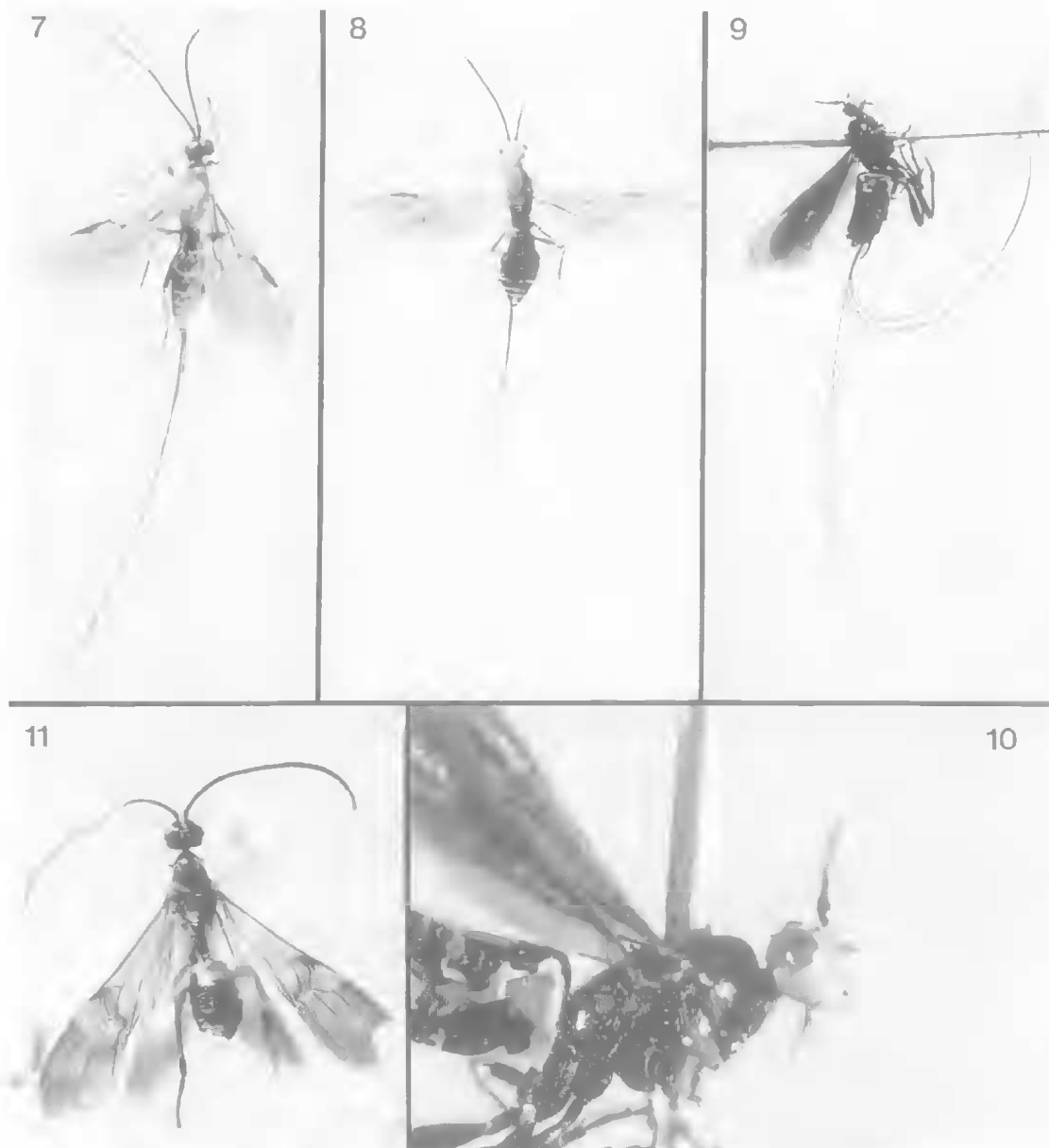
Mesosoma 1.5 times longer than high; largely coriaceous but mesosternum largely smooth and shiny. Precoxal suture very weakly, broadly im-

pressed. Mesopleural suture smooth. Propodeum with a complete mid-longitudinal carina.

Forewing. Lengths of veins SR1: 3-SR:r = 6.7:2.2:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.7:2.0:1.0. Vein 2-SR+M moderately long; shortest distance between 1st subdiscal cell and 2nd submarginal cell: length of vein m-cu = 1.0: 1.25. Veins cu-a and 3-CU1 both more or less interstitial.

Lengths of fore femur: tibia: tarsus = 1.0: 1.2: 1.53. Lengths of hind femur: tibia: basitarsus = 1.47: 2.3: 1.0. Hind basitarsus 10 times long than deep.

First tergite 1.8 times longer than posteriorly wide; with rugose sculpture and with thin irregular mid-longitudinal carina. Second tergite 1.2 times wider posteriorly than medially long. Second and 3rd tergites with strong longitudinal



FIGS 7-11. 7. *Eunesaulax terebratus* Tobias, ♀. 8. *Euurobraconoides longicaudis* Quicke, ♀. 9,10. *Psittacobracon lacteolus* Quicke, ♀. 11. *Calcaribracon willani* sp.nov., ♀ holotype.

striations (Fig. 109) interspersed with punctate sculpture. Tergites 4 and 5 with fine rugulose to coriaceous sculpture. Fifth tergite without postero-lateral emarginations. Ovipositor (exserted part) about as long as the 5th tergite; with a distinct pre-apical dorsal nodus, apico-ventrally virtually smooth (Fig. 134).

Uniformly pale brownish yellow, flagellum becoming piceous beyond middle, ovipositor sheaths black. Wings weakly infusate with brown venation.

ETYMOLOGY

Named after our esteemed colleague Vladimir Tobias of the Russian Academy of Science, St Petersburg, who drew our attention to many interesting Australian Braconinae.

**Atanycolus* Foerster
(Figs 77, 80, 82, 84, 103)

Synonyms. *Coelobracon* Thomson; *Melanobracon* Ashmead; *Atanycolidae* Viereck

A widespread genus of medium-sized wasps, commonest in the Nearctic and Palearctic though with some closely related and more derived groups occurring in the neotropics (e.g. *Hemibracon* Szépligeti) and Indo-Australian region (*Nedinoschiza* Cameron). *Nedinoschiza*, which is probably only a specialized derivative of *Atanycolus*, has not yet been recorded from Australia though it may occur there; it can be distinguished from *Atanycolus* by the greatly enlarged anterior tentorial pits. (Quicke, 1987 b)

Atanycolus tomentosus Szépligeti, previously placed in the Braconinae (see Parrott, 1953), is in fact a member of the Doryctinae (Quicke, 1984).

Atanycolus australiensis sp. nov.
(Figs 77, 80, 82, 84)

MATERIAL EXAMINED

HOLOTYPE ♀ with the following label: 'Australia 35-40 km NO Deniliquin, Tobias 12-13.iv.1978'. Deposited in ANIC.

DESCRIPTION (♀)

Length of body 3.9mm, of forewing 3.8mm, of ovipositor (part exserted beyond apex of metasoma) 3.3mm and of antenna 3.0mm.

Antennae (broken) with at least 29 flagellomeres, all flagellomeres longer than wide. First flagellomere 1.25 and 1.5 times longer than 16 2nd and 3rd respectively, the latter being 1.75 times longer than apically wide. Height of eye:

shortest distance between eyes: width of head = 1.1: 1.0: 2.1. Face shiny, weakly at and with many deep punctures at the bases of the silvery setae. Eyes sparsely setose; emarginate opposite antennal sockets. Head very elongate (Fig. 77); length of head behind eye: horizontal length of eye = 1.0: 1.0. Ocelli small; distance between posterior ocelli; transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 2.0: 1.0: 4.0.

Mesosoma 2.0 times longer than maximally high. Antescutal depression well-developed. Scutellar sulcus shallow with few weak punctures. Scutellum protruding in profile.

Forewing. Lengths of veins SR1: 3-SR: r = 5.3: 2.85: 1.0. Lengths of veins 2-SR: 3-SR: r-m = 1.56: 2.5: 1.0. Vein r-m largely unsclerotized. Vein 1-SR+M rather strongly curved. Veins C+SC+R and 1-SR forming an angle of approximately 80°. Vein cu-a interstitial. Vein CU1b almost as long as 3-CU1.

Hindwing. Vein C+SC+R very thick, apex with a single, very large, specialized catch bristle (Fig. 103). Base of wing evenly setose.

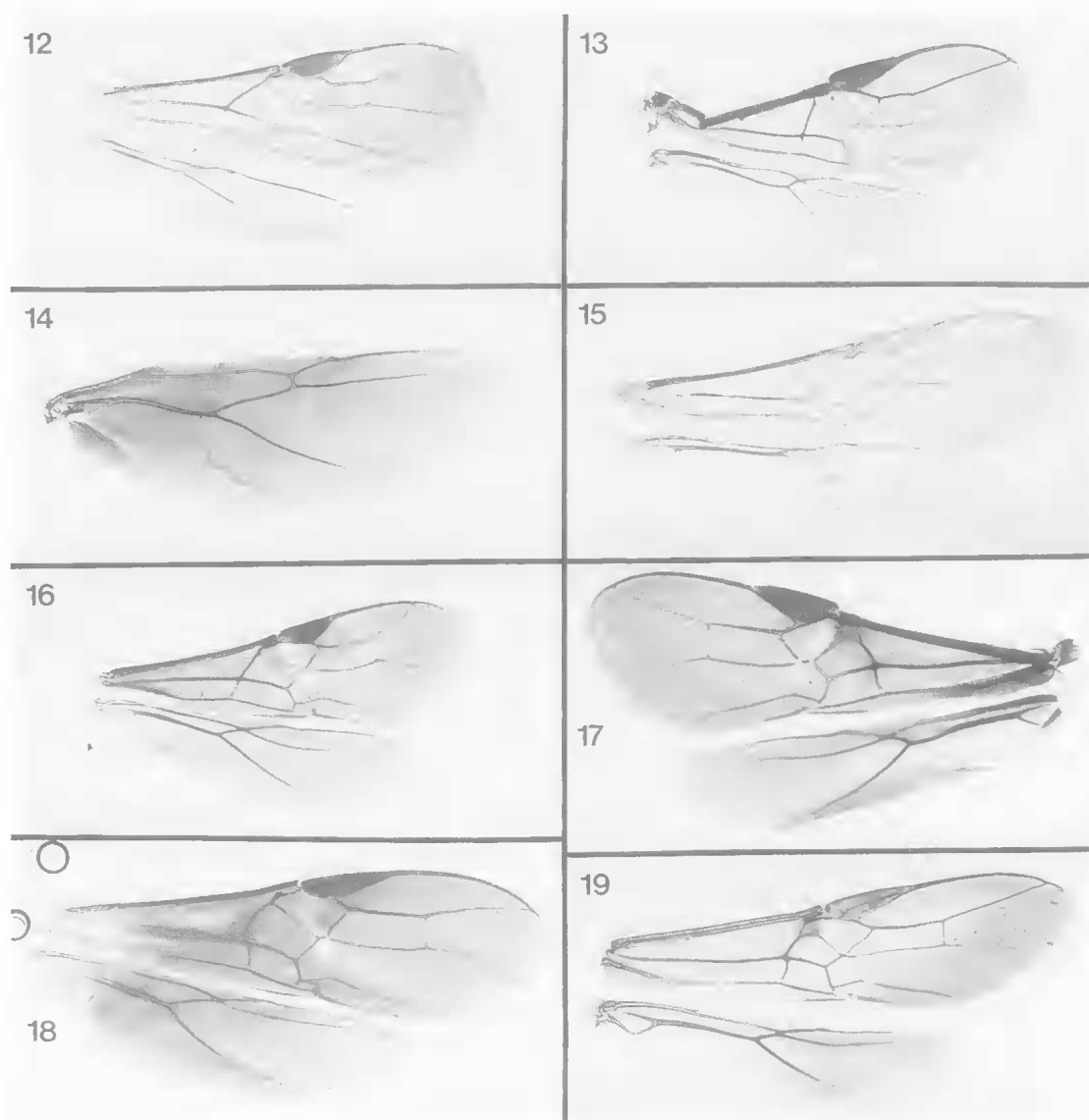
Fore tibia with a well-developed longitudinal row of pegs (Fig. 82). Length of fore femur: tibia: tarsus = 1.0: 1.16: 1.45. Length of hind femur: tibia: basitarsus = 1.95: 2.9: 1.0.

Metasoma largely smooth and shiny. First tergite more or less parallel-sided; raised median area with weak irregular, longitudinal striate sculpture. Second tergite 1.62 times wider than medially long; with a large, acute, triangular mid-basal area bordered on each side by a finely crenulate groove; with sub-lateral, curved, longitudinal, finely crenulate grooves. Second suture sinuous, crenulate. Third tergite with well developed antero-lateral areas. Tergites 3-6 smooth and shiny, without transverse sub-posterior grooves, with posterior margins membranous. Ovipositor (exserted part) approximately 0.85 times length of forewing.

Largely piceous brown except following: head orange-yellow; mesosoma and tergites 5-7, black; posterior (membranous) margins of tergites 4-6 ivory white. Wings light brown with darker brown venation.

Bracon Fabricius
(Figs 51, 53)

Synonyms. *Microbracon* Ashmead; *Amicoplidea* Ashmead; *Macrodyctium* Ashmead; *Tropidobracon* Ashmead; *Liobracon* (Ashmead) Nason; *Seliadus* Brethes.



FIGS 12-19. Wings: 12, *Africadesha tobiassi* sp.nov., ♀ paratype; 13, *Trigastrotheca* sp., ♀ (African species); 14, *Calcaribracon* (*Calcaribracon*) *diores* (Cameron); 15, *Tropobracon* sp., ♀ (African species); 16, *Vipiomorpha ypsilon* Tobias, ♀ (Russian specimen); 17, *Mollibracon bimar*is (Turner), ♀; 18, *Hybogaster* sp., ♀ (Papua New Guinea specimen); 19, *Virgulibracon endoxylaphagus* sp.nov., ♀.

A vast cosmopolitan genus of small wasps which parasitize a wide range of other insects (Quicke, 1988b). Concealed Lepidoptera larvae are the commonest hosts followed by Coleoptera, Diptera, and Hymenoptera-Symphyta (e.g. Austin & Faulds, 1989); in Australia, gall forming Homoptera also appear to be attacked (Chadwick & Nikitin, 1975) but this record should be checked by careful observa-

tion of larval feeding habits. To date only approximately twenty species have been recorded from Australia (Parrot, 1953; Austin & Faulds 1989). However, this is a considerable underestimate and the true number of Australian species is probably in the hundreds. The genus occurs throughout Australia and is morphologically rather diverse there with some distinctive species groups.

Calcaribracon Quicke
(Figs 11, 14, 27, 52, 91, 95)

A small genus ranging from Queensland through New Guinea, Indonesia and Malaysia to SE China and Japan. Keys to the species have been provided by Quicke (1986a, 1988d). Three species are known from Australia, all from Queensland, viz. *C. (Arostrobracon) walkeralis* (Shenefelt), *C. (Arostrobracon) diores* (Cameron) and *C. (Arostrobracon) willani* sp.nov. The Australian specimen of *C. diores* examined differs from the New Guinea specimens in the colour of the hind coxa and femur (yellow not black) and in having forewing vein cu-a less strongly curved. Thus it may in future be found to represent a further new species. We have also included the nominal subgenus in the generic key presented here though all known members of that group have a more northerly distribution (Papua New Guinea to China and Japan). Nothing is known of the biology of the Australian members of this genus but one Japanese species has been reared from larvae of members of the sesiid moth genus *Paranthrene* (Maetô, 1992), while a specimen of *C. ferax* (Smith) from Papua New Guinea in the BMNH has a label 'reared ex cerambycid larva' (Quicke, 1986a); while the former record is definitely correct and agrees better with the known hosts of the related genus *Myosoma* (Quicke, 1989c), the latter record could be erroneous.

Key to Australian species of *Calcaribracon*

1. Pterostigma, base of forewing vein r (usually), and 2nd metasomal tergite largely yellow or orange-yellow (Fig. 11); basal fifth to half of forewing yellow (Fig. 11) 2
- Pterostigma, forewing vein r and 2nd metasomal tergite entirely piceous brown or black; forewing uniformly dark brown *C. diores* (Cameron)
2. Propleuron, propodeum, mid-legs, hind femur, median area of 1st metasomal tergite, metasomal tergites 3-7 piceous or black (Fig. 11); basal half of forewing yellow *C. willani* sp.nov.
- Mesosoma and metasoma up to the 7th tergite, midlegs and hind leg except apex of tibia and tarsus, yellow or orange-yellow; forewing with only basal half of basal and sub-basal cells yellow *C. walkeralis* (Shenefelt)

Calcaribracon (Arostrobracon) willani
sp.nov. (Figs 11, 52, 91)

MATERIAL EXAMINED

HOLOTYPE: ♀ with the following label: 'Zillmere Brisbane, Q. 27 August 1988 G.V. Maynard'. Deposited in QMBA.

DESCRIPTION (♀)

Length of body 8.3mm, of forewing 8.8mm, of ovipositor (part exerted beyond apex of metasoma) 1.1mm and of antenna 8.0mm.

Antenna with 65 flagellomeres. Terminal flagellomere acuminate, 1-8 times longer than maximally wide. Penultimate flagellomere 1.25 times longer than wide. Median part of flagellum rather flattened, median flagellomeres at their widest approximately 1.6 times wider than long. First flagellomere 1.7 times longer than both the 2nd and 3rd separately, the latter being 1.2 times wider than long. Height of eye: width of face: width of head = 1.1:1.0:2.0. Eyes sparsely setose. Lateral half of frons moderately densely with short erect setae. Horizontal length of head behind eye: horizontal length of eye = 1.0:1.37.

Mesosoma 1.7 times longer than high. Mesoscutum almost totally glabrous.

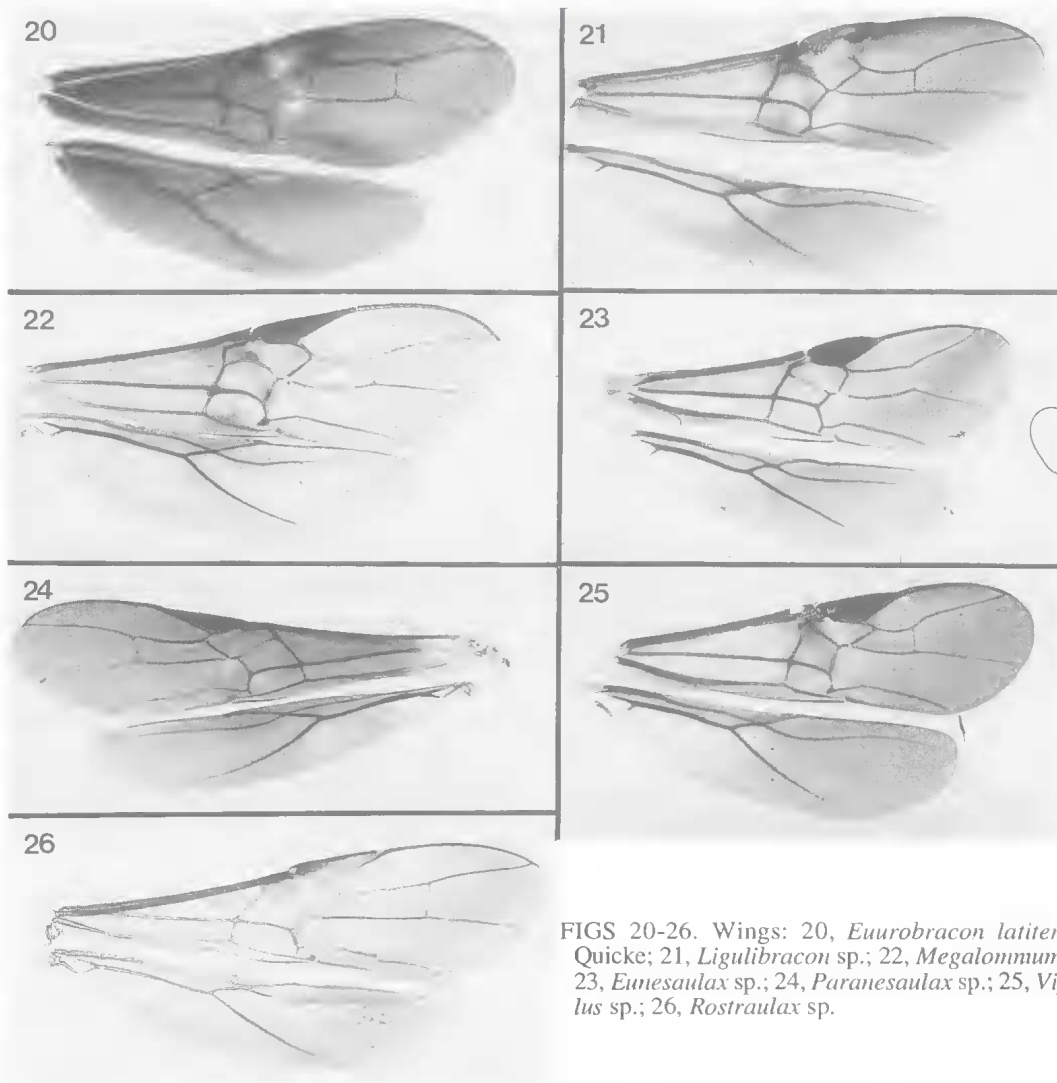
Forewing. Lengths of veins SR1:3-SR:r = 3.5:2.2:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.37:2.2:1.0. Vein r-m with 2 distinct bulli. Vein cu-a antefurcal, strongly bent.

Hindwing. Lengths of veins 1r-m : SC+R1 = 1.05:1.0. Apex of vein C+SC+R with one especially thickened bristle. Vein 2-CU almost reaching wing margin.

Lengths of fore femur: tibia: tarsus = 1.0:1.13:1.33. Lengths of hind femur: tibia: basitarsus = 2.3:2.8:1.0. Hind basitarsus 3.3 times longer than deep.

First metasomal tergite approximately 2.0 times longer than maximally wide, flattened lateral areas of tergum virtually absent sub-posteriorly. Ovipositor (part exerted beyond apex of metasoma) 1.5 times longer than hind basitarsus; 0.1 times length of forewing.

Black except the following which are bright orange-red: pronotum (largely), mesoscutum, scutellum mesopleuron, mesosternum, tegulae, metanotum, posterior of propodeum, apex of fore femur, fore tibia (except spur), fore tarsus, lateral areas of 1st metasomal tergite and 2nd metasomal tergite. Forewing yellow basally, brown apically with yellow pterostigma (Fig. 11).



FIGS 20-26. Wings: 20, *Euurobracon latitempus* Quicke; 21, *Ligulibracon* sp.; 22, *Megalommum* sp.; 23, *Eumesaulax* sp.; 24, *Paranesaulax* sp.; 25, *Vipielus* sp.; 26, *Rostraulax* sp.

ETYMOLOGY

Named after Richard Willan for his kindness and help during DLJQ's visit to Australia.

Callibracon Ashmead (Figs 50, 64)

Synonyms. *Poecilobacon* Cameron syn.nov.

This is a vast, mostly Australian genus of medium-sized to large (and often common) braconines that are greatly in need of taxonomic revision. Previously species were often referred to under the genus *Ipobracon* Thomson (a junior synonym of *Cyanopterus* Haliday). Species have been reared from a variety of wood-boring,

coleopterous hosts including Elateridac and Scolytidac, and three species have been collected in association with *Eucalyptus* infested with the cerambycid genus, *Phoracantha* (Quicke, 1989c; Quicke et al., 1992). Some species are gregarious parasitoids.

The genus *Poecilobracon* Cameron (type species: *Poecilobracon flaviceps* Cameron 1901: 122) is treated here as a new subjective synonym of *Callibracon* since examination of a large number of specimens has shown that the characters used by Quicke (1987b) to distinguish between these, viz. scapus length and metasomal sculpture, show great variation and cannot therefore be used as generic characters.

Campyloneurus Szépligeti
(Fig. 62)

Synonyms. *Monolcia* Enderlein; *Diolcia* Enderlein.

A medium-sized genus of small to medium-sized wasps which are found from India and Japan to Australia. Several species are reported from Australia (Parrott, 1953) but only two appear to be common. Several Australian species included under *Campyloneurus* in the past are referable to *Pycnobraconoides* gen.nov. Australian species of *Campyloneurus* species appear to be largely or perhaps exclusively parasitoids of cerambycid larvae, one Australian species having frequently been reared from members of the cerambycid beetle genus *Zygrita* on a variety of legumes including soya-bean. However, there is a record from grass tree (*Xanthorrhoea*) stems that were infested with both Curculionidae and Cerambycidae. Two host records from India suggest that elsewhere *Campyloneurus* spp. may also attack stem-boring pyralid moth larvae (Quicke, 1989c). The available evidence suggests that at least some species are gregarious parasitoids.

Cedilla Quicke
(Figs 94, 124)

Known from only a single Australian species of medium-sized Aphrastobraconini (Quicke & Tobias, 1990). Nothing is known of its biology though the type specimen of the type species was collected at light indicating that they may be crepuscular or nocturnal as appears to be commonly the case with Australian Aphrastobraconini (Quicke, 1992).

Chaoilta Cameron
(Figs 34, 35, 36, 37, 38, 39, 40, 44, 69)

Synonyms. *Blastomorpha* Szépligeti; *Platybracon* Szépligeti; *Iphioilta* Ramakrishna Ayyar.

A rather small genus of medium-sized to large braconines. Distributed from India to Australia, most species have been described from Indonesia and New Guinea. The five Australian species were treated by Quicke (1991a); *C. (Blastomorpha) decorata* Szépligeti is restricted to north Queensland the other four species belonging to the nominal subgenus are more widespread. Nothing is known of the biology of *Chaoilta*. However, the closely related genera *Atanycolus* Foerster, principally from the Holarctic, and *Odontoscopus* Kriechbaumer from the Afrotropical Region are both parasitoids of bark-boring

coleopterous larvae, particularly of the families Bostrychidae and Buprestidae (Quicke, 1988b, 1989c).

Curriea Ashmead

A small genus of the tribe Aphrastobraconini originally described from the Afrotropical Region but widespread through the Old World tropics and recorded from Australia for the first time by Quicke (1992). We have seen several Australian species, all of which appear to be undescribed.

Esengoides Quicke

A small genus of the tribe Braconini known from only two species: *E. fulvus* Quicke from Australia (north Queensland) and *E. crenulatus* Quicke from the Solomon Islands (Quicke, 1989b). Small wasps with wing lengths less than 5mm. Nothing is known of their biology.

Eucurriea Quicke
(Figs 28, 31, 43)

A small genus of medium-sized wasps previously confused with *Megalommum* and *Curriea* Ashmead (see Quicke & Tobias, 1990). Frequently collected at light (Quicke, 1992); nothing else is known of their biology.

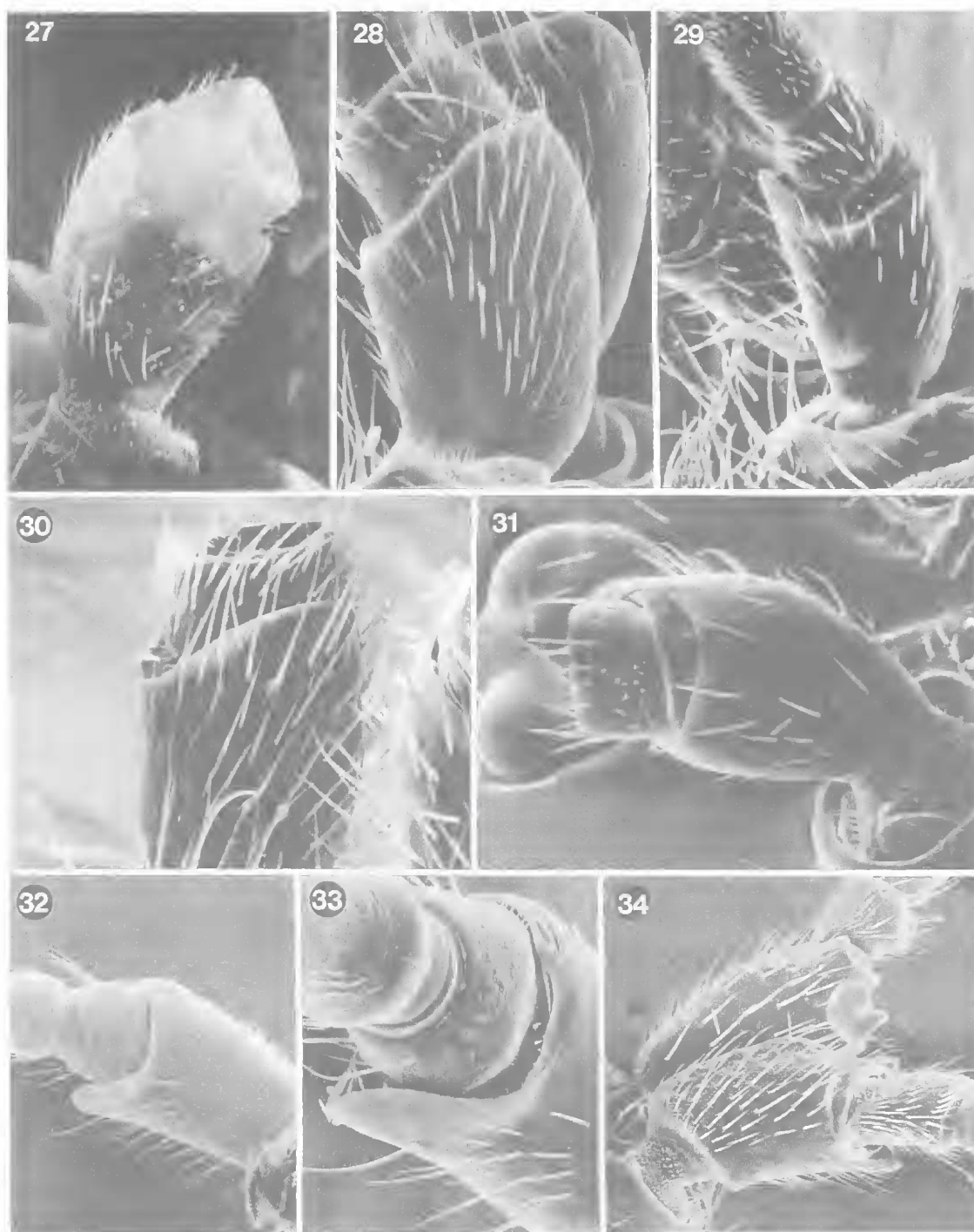
Eunesaulax Tobias
(Figs 7, 23, 60, 68, 135, 136)

A small genus of medium-sized rather slender wasps, known from three Australian species, *E. terebratus* Tobias, *E. nigriventris* Tobias and *E. radialis* Tobias (Quicke & Tobias, 1990). The wing venation is fairly distinctive but the form of the ovipositor apex shows considerable variation (Fig. 135 cf. 136). Nothing is known of their biology and their relationships are still uncertain.

Euurobracon Ashmead
(Figs 20, 48, 56, 96)

Synonyms. *Delmira* Cameron; *Exobracon* Szépligeti; *Lissobracon* Cameron.

It is not known for certain whether this genus occurs in Australia. A single specimen of *E. latitempus* Quicke was found in a Queensland collection but it lacked data (Quicke, 1989a). However, as *Euurobracon* occurs in Papua New Guinea it is quite likely that it also occurs at least



FIGS 27-34. Features of scapus and pedicellus: 27, *Calcaribracon* sp., medial aspect; 28, *Eucurriea* sp., lateral aspect; 29, *Ligulibracon* sp., lateral aspect; 30, *Hybogaster* sp., ventro-medial aspect; 31, *Eucurriea* sp., medial aspect; 32, *Iphiaulax* sp., lateral aspect; 33, *Iphiaulax* sp., apico-ventro-medial aspect; 34, *Chaoilta* (*Chaoilta*) sp., lateral and medial aspects.

in far north Queensland. *Euurobracon* species are large wasps, sometimes with extremely long ovipositors (van Achterberg, 1986; Quicke, 1987b), and they have been reared from cerambycid beetle larvae living deep within wood (Quicke, 1989c).

***Euurobraconoides* Quicke**
(Fig. 8)

Medium-sized braconines belonging to the tribe Euurobraconini with wing-lengths between 9 and 11mm. Known from a single Australian (north Queensland) species, *E. longicaudis* Quicke (Fig. 8). Nothing is known of its biology (Quicke, 1988c) but one specimen is labelled as having been collected in rainforest.

****Furcadesha* Quicke**

Small wasps belonging to the Adeshini. Known only from the type species *F. huddlestoni* from India and *F. walteri* sp.nov. from south-west Queensland. Nothing is known of the biology of any of the Adeshini though both *F. walteri* and the new *Africadesha* (q.v.) species described above were collected by vacuum suction from grass and low herbs.

Key to species of *Furcadesha*

1. Forewing vein SR1 more than 2.4 times longer than vein 3-SR; lateral lobes of mesoscutum extensively setose; mesosoma and metasomal tergites extensively marked with black*F. huddlestoni* Quicke
- Forewing vein SR1 less than 1.8 times longer than vein 3-SR; lateral lobes of mesoscutum largely glabrous except postero- medially and along line of notaulus; mesosoma and metasoma entirely brownish yellow to brownish orange*F. walteri* sp.nov.

***Furcadesha walteri* sp.nov.**

(Figs 81, 89, 110, 111)

MATERIAL EXAMINED

HOLOTYPE: ♀ with the following labels: 'MT. Nebo, S.E. Queensland. 1.IV. 1974 I.D. Galloway' and 'CAUGHT USING D- VAC SUCTION NET'. Deposited in QMBA (originally from QDPI).

DESCRIPTION (♀)

Length of body 3.1mm, of forewing 3.1mm and

of ovipositor (part exerted beyond apex of metasoma) 0.3mm.

First flagellomere 1.25 times longer than the 2nd. Scapus normal, not expanded dorsally. Height of clypeus: inter-tentorial distance: tentorio-ocular distance = 1.0:1.6:1.35. Height of eye: width of face: width of head = 1.0:1.35:2.5. Face smooth. Horizontal length of eye: horizontal length of head behind eye = 2.8:1.0. Head strongly narrowed behind eye. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.6:1.0:3.3.

Mesosoma 1.65 times longer than high. Mesoscutum setose medio- posteriorly and along lines of notauli. Notauli deeply impressed, minutely crenulate. Medio-posterior part of mesoscutum rugose, otherwise mesoscutum smooth and shiny. Precoxal suture virtually absent, mesopleuron and mesosternum largely smooth and shiny.

Forewing. Lengths of veins SR1:3-SR:r = 7.25:4.5:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.1:2.0:1.0. Vein 2-SR+M short; shortest distance between 1st subdiscal cell and 2nd submarginal cell: length of vein m-cu = 1.0:2.7. Vein cu-a interstitial. Vein 3-CU1 slightly postfurcal with respect to m-cu.

Base of hindwing evenly setose. Posterior margin of hindwing distinctly emarginate.

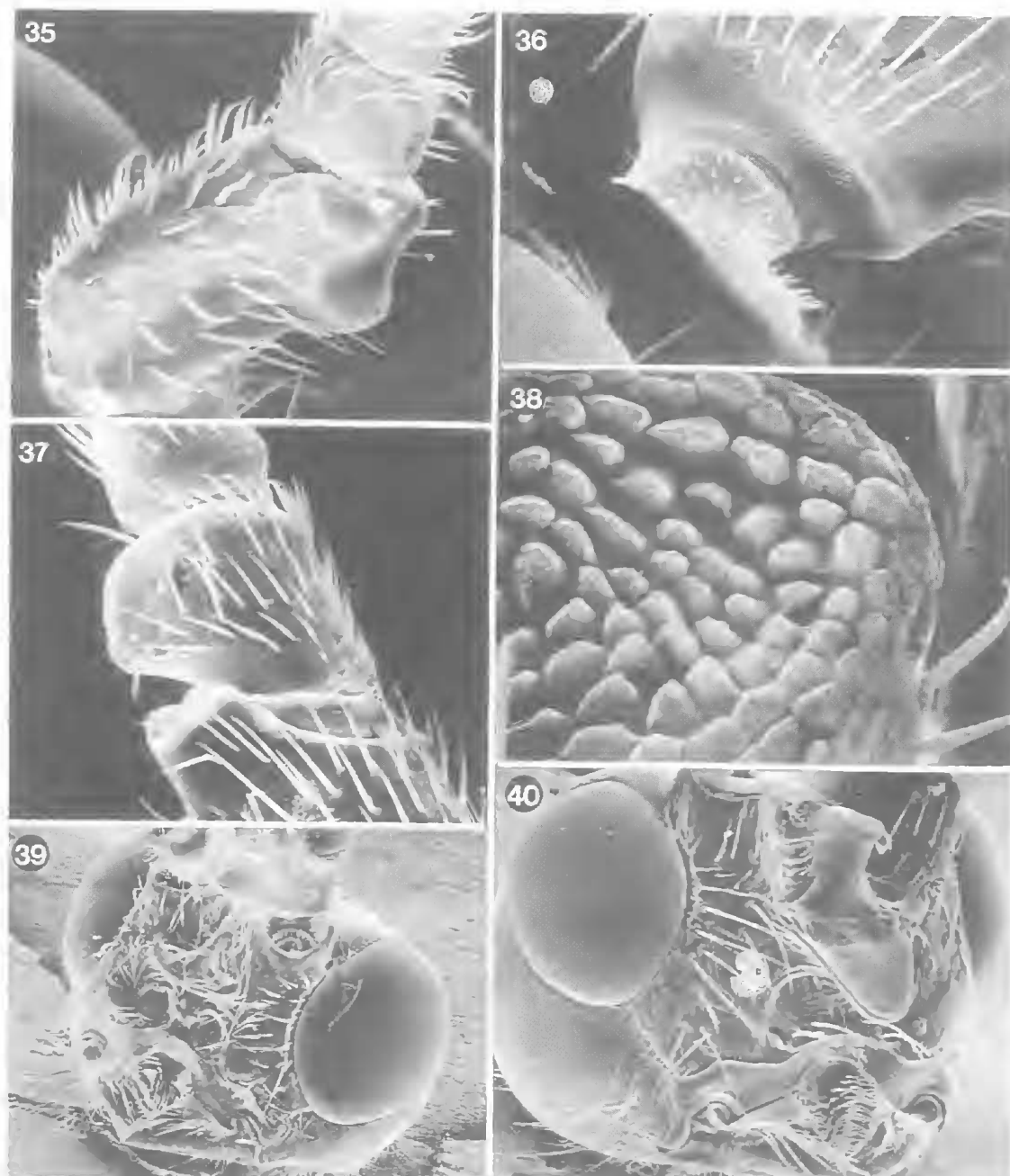
Lengths of fore femur: tibia : tarsus = 1.0:1.29:1.52. Lengths of hind femur: tibia: basitarsus = 1.3:2.4:1.0. Hind basitarsus 9 times longer than maximally deep.

Metasomal tergites largely evenly sculptured with fine, anastomosing, longitudinal ridges separated by rows of punctures (as in *huddlestoni* Quicke), but 5th tergite with longitudinal striation weaker and less regular. First tergite 1.1 times longer than posteriorly wide. Second tergite 1.5 times wider posteriorly than medially long. Posterior margin of 5th tergite with well-developed perimedial projections and with lateral emarginations.

Yellowish-brown except for antennae and apices of tarsi which are piceous and ovipositor sheaths which are black. Wings slightly hyaline with brown venation.

ETYMOLOGY

Named in honour of the senior author's father, Walter Jesse Quicke, for his years of patience.



FIGS 35–40. Features of scapus, pedicellus and face: 35, *Chaoilta (Chaoilta)* sp., scapus and pedicellus apico-medial aspect; 36, *Chaoilta (Chaoilta)* sp., base of scapus, lateral aspect; 37, *Chaoilta (Chaoilta)* sp., pedicellus, medial aspect; 38, *Chaoilta (Blastomorpha) decorata*, detail of apical part of pedicellus; 39, *Chaoilta (Chaoilta)* sp., head; 40, *Chaoilta (Blastomorpha) decorata*, head.

****Gelasinibracon* Quicke**
(Figs 45, 71, 73, 10)

Small braconines of the tribe Braconini with

wing lengths less than 6mm. Known only from two closely related species: *G. sedlaceki* Quicke from Papua New Guinea and north Queensland and *G. simplicicaudatus* Quicke, only known

from Papua New Guinea (Quicke, 1989b). Nothing is known of their biology.

Habrobracon Ashmead
(Fig. 86)

Habrobracon is closely related to *Bracon*, which is probably paraphyletic because *Habrobracon* is classified separately. Cosmopolitan group of small wasps, with about twenty described species. Several species have been employed as biological control agents principally against stored product pests and *H. gelechiae* (Ashmead) has been introduced into Australia. *H. hebetor* (Say) is also recorded from Australia where it has been reared from *Cactoblastis cactorum*.

Hybogaster Szépligeti
(Figs 18, 30, 47, 67, 128)

Large wasps apparently related to the *Euurobraconini* (Quicke, 1988a). A principally Indo-Australian genus but with one species occurring in South Africa (Quicke, 1988a) and another in north Queensland. It should be noted however, that Parrott's (1953) record of *Hybogaster* from Australia is a misidentification of *Iphiaulax australiensis* Ashmead (Quicke, 1991a). Nothing is known of the biology of *Hybogaster* species but members of the related genus *Zeuzerilia* van Achterberg are parasites of Cossidae (van Achterberg, 1989).

Hyboteles van Achterberg
(Figs 72, 74, 105, 115)

Small wasps belonging to the subtribe *Aspidobraconina* of the *Braconini*. *Hyboteles* ranges from Brunei and the Philippines to north Australia and is monophyletic. Probably all *Aspidobraconina* are endoparasitoids of butterfly pupae; *Hyboteles toxopeusi* van Achterberg has been reared as a solitary endoparasitoid from a lycaenid pupa in Papua New Guinea (Quicke, 1987a, 1988b).

Iphiaulax Foerster
(Figs 32, 33, 63, 129)

Synonyms. *Anipphiaulax* Kokoujev; *Iphiaulacidea* Fahringer; *Euglyptobracon* Telenga

A large and virtually cosmopolitan genus of medium-sized braconines. Eight Australian species were treated by Quicke (1991a); several of

these had previously been wrongly placed in *Cynopterus* Haliday or *Hybogaster* Szépligeti. Subsequently, the senior author has seen specimens of two undescribed Australian species in the collection of the AEIG. Nearly all members of the genus appear to be specialized parasitoids of eurytomid beetle larvae (Quicke, 1988b) but van Achterberg (1989) reported one species as having been reared from cossid moth larvae. Some species are frequently collected amongst mangroves and females are capable of giving a painful sting (DLJQ, pers. obs.).

Ligulibracon Quicke
(Figs 21, 42, 55, 88, 123)

A small genus of medium-sized to large *Aphrastobraconini* entirely restricted to Australia; apparently only the type-species, *L. levor* Quicke, is described though several others have been seen in collections by the senior author. Nothing is known of the biology of *Ligulibracon*, though, in common with other Australian *Aphrastobraconina*, they seem to be at least partially nocturnal (Quicke, 1992).

Macrobracon Szépligeti
(Figs 57, 58)

A small genus of large braconines belonging to the *Mesobracon* Szépligeti group (see Quicke, 1987b). *Macrobracon* ranges from north Queensland to south India; only one species, *M. nobilis* Turner, occurs in Australia (Shenefelt, 1978). Nothing is known of the biology of *Macrobracon* though members of the related oriental genus *Pseudoshirakia* van Achterberg attack stem-boring pyralid moth larvae in grain crops (Achterberg, 1983).

Megalommum Szépligeti
(Figs 22, 41, 49, 61)

Medium-sized species of *Aphrastobraconini* primarily from Australia, where there are many undescribed species, but also occurring in Papua New Guinea. Frequently collected at light (Quicke, 1992). The ovipositors of members of this genus collectively display a great deal of variation in length and shape but typically lack apico-ventral serrations probably indicating that oviposition takes place into a soft substrate.

Molibracon Quicke
(Figs 17, 133)

A monotypic genus of medium-sized wasps entirely restricted to Australia. *M. bimaris* (Turner) has been reared as a parasitoid of curculionid larvae, *Meriphus longirostris*, in *Banksia* cones (Quicke, 1988b). Most specimens seen by us are from Western Australia.

Myosoma Brullé
(Figs 2, 54, 70)

Synonyms. *Acanthobracon* Kriechbaumer; *Amyosoma* Viereck

A largely neotropical genus of small to medium-sized Braconini but with a few mostly smaller species known from the Old World tropics (Quicke & Wharton, 1989). *Myosoma rufescens* is the first true record of this genus in Australia (see Quicke, 1988b); *M. mutator* (Fabricius) belongs to *Pycnobraconoides* gen. nov. *Myosoma* spp. appear to be principally parasitoids of concealed pyralid moth larvae (Shenefelt, 1978; Quicke & Wharton, 1989) but *M. chinensis* has also been reared from the larvae of the cossid *Zeuzera* in India, and *M. yanoi* (Watanabe) has been reared from larvae of the sesiid *Paranthrene regale* in Japan (Maetô, 1992).

Key to Indo-Australian species of *Myosoma*

1. Metasomal tergites 1-5 bright orange contrasting strongly with piceous or black tergites 6-9 (Fig. 2); head largely black *M. rufescens* sp. nov.
- Metasomal tergites unicolorous piceous or black; head variably coloured *M. chinensis* (Szépligeti) & other spp.

Myosoma rufescens sp. nov.
(Fig. 2)

MATERIAL EXAMINED

HOLOTYPE: ♀ with the following labels: 'AUSTRALIA: ACT Canberra, Black Mtn. Jan 25-30, 1984 L. Masner, MT' & 'Dry sclerophyl Eucalyptus for.' From AEIG but on permanent loan to ANIC by agreement with collections manager.

PARATYPE: ♂ with the following labels: 'QUEENSLAND: Mirani 34km NW Mackay X-16-79' and 'HE & MA Evans & A. Hook Coll.', ANIC.

DESCRIPTION (♀)

Length of body 5.7mm, of fore wing 5.5mm

and of ovipositor (part exerted beyond apex of metasoma) 1.3mm.

First flagellomere 1.07 times longer than both the 2nd and 3rd separately. Third flagellomere 1.4 times longer than wide. Height of clypeus: intertentorial distance: tentorio-ocular distance = 1.0: 3.7: 2.3. Face smooth medially; coriaceous and densely setose laterally. Height of eye: shortest distance between eyes: width of head = 1.05:1.0:2.0. Frons densely setose except along the median line. Post-ocellar line: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.4:1.0:3.57. Occiput largely glabrous. Horizontal length of eye 1.7 times horizontal length of head behind eye.

Mesosoma 1.5 times longer than high. Notauli weak but impressed along whole length of mesoscutum. Lateral lobes of mesoscutum glabrous.

Forewing. Lengths of veins SR1:3-SR: r = 3.9: 3.0: 1.0. Lengths of veins 2-SR:3-SR:r-m = 1.1: 2.0: 1.0. Pterostigma 3.15 times longer than maximally wide. Vein cu-a virtually interstitial. Vein 1-SR+M straight.

Hindwing. Lengths of veins 1r-m: SC+R1 = 1.0:1.7. Apex of vein C+SC+R with one especially thickened bristle. Base of wing evenly setose.

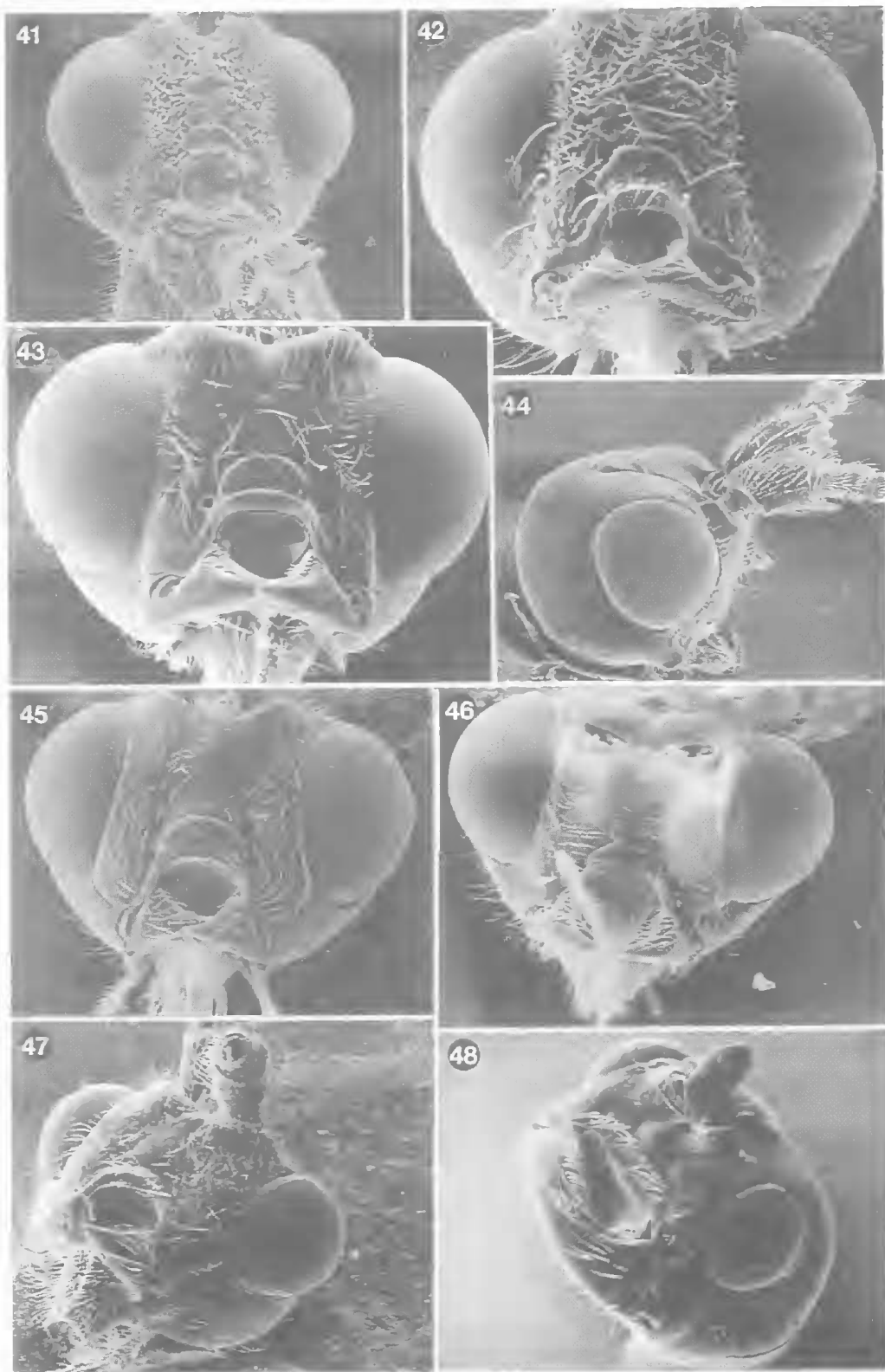
Lengths of fore femur: tibia: tarsus = 1.0: 1.1: 1.3. Lengths of hind femur: tibia: basitarsus = 1.9: 2.8: 1.0. Hind femur 3.2 times longer than maximally wide. Hind tarsus 7.0 times longer than maximally wide. Hind basitarsus 6.5 times longer than apically deep.

Metasoma smooth and shiny. First tergite approximately 2.2 times longer than maximally wide; lateral areas narrow but complete. Second tergite with antero-lateral corners with reduced sclerotization. Second suture straight, narrow, quite deep. Tergites 3 to 6 with irregular, sparse, short setosity posteriorly.

Pale orange brown to brownish yellow except for the following which are black or piceous: antennae; head except labio-maxillary complex, palps and base of mandibles; mid- and posterior legs; metasomal tergites 6 and 7; ovipositor sheaths. Wing membrane pale brown slightly paler distally; venation and pterostigma dark brown.

DESCRIPTION (♂)

As for female except slightly smaller and the middle leg is brownish yellow except for the telotarsus which is piceous.



***Paranesaulax** Quicke
(Figs 24, 99, 106, 127)

Medium-sized braconines known from only one described species from Papua New Guinea, *P. nitor* Quicke. A possibly conspecific individual from north Queensland has been seen by the authors. Nothing is known of the biology of this genus.

Pedinopleura van Achterberg
(Figs 78, 114, 121, 122)

Small species belonging to the Aspidobraconina. In addition to *P. australiensis* sp.nov., two non-Australian species have been described (Achterberg, 1984) but many undescribed ones occur in South Africa, India through Malaysia to New Guinea and north Australia. There are no host records for this genus but three other genera of the Aspidobraconina (*Aspidobracon* van Achterberg, *Hyboteles* van Achterberg and *Philomacroploea* Cameron) have been reared from butterfly pupae (van Achterberg, 1984; Quicke, 1987a).

Key to the Indo-Australian species of
Pedinopleura (♀♀ only)

1. Face, frons, temples and vertex smooth; lateral margin of syntergite 1+2+3 with an obvious notch (Fig. 122); antenna largely brownish becoming piceous apically ... *P. emarginata* van Achterberg
- Face, frons, temples and vertex striate (Fig. 78); lateral margin of syntergite 1+2+3 without notch, evenly curved or with a single posterior lobe (Fig. 121); antenna black 2
2. Metasomal tergites 3-5 with a dark spot on either side; posterior margin of 6th metasomal tergite with a well-developed emargination; lateral margin of syntergite without a posterior lobe; frons and vertex coarsely transversely striate *P. kosuensis* (Watanabe)
- Metasomal tergites 3-5 unicolorous brownish yellow; posterior margin of 6th metasomal tergite only very weakly emarginate (Fig. 114); lateral margin of syntergite with a well-developed posterior lobe (Fig. 121); frons and vertex very finely transversely striate (Fig. 78) *P. australiensis* sp.nov.

Pedinopleura australiensis sp.nov.
(Figs 78, 114, 121)

MATERIAL EXAMINED

HOLOTYPE: ♀ with following labels: 'Ayr Queensland 4 Sep. 1950 E.F.Riek'. Deposited in ANIC.

PARATYPE: ♂ with same data as holotype. ANIC.

DESCRIPTION (♀)

Length of body 4.5mm, and of forewing 4.3mm, of ovipositor (part exerted beyond apex of metasoma) 1.1mm and of antenna 4.1mm.

Antenna with 36 flagellomeres. Terminal flagellomere pointed but not acuminate, 2.1 times longer than basally wide. Median flagellomeres approximately as wide as long. First flagellomere 1.3 times longer than both the 2nd and 3rd separately, the latter being 1.2 time longer than wide. Height of clypeus: inter-tentorial distance: tentorio-ocular distance = 1:2:2. Height of eye: width of face: width of head = 1.0:1.5:1.77. Malar suture deep and narrow. Face with multiple, strong, parallel, transverse ridges. Eyes virtually glabrous. Frons and occiput finely subtransversely carinate. Head very transverse; horizontal length of head behind eye: horizontal length of eye = 2.35:1.0 Post-ocellar length: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.0:1.0:2.75.

Mesosoma 1.4 times longer than high; strongly sculptured, mostly punctate. Median area of metanotum with a complete mid-longitudinal carina. Precoxal suture not impressed; indicated by a band of punctures. Propodeum with a complete mid-longitudinal carina bordered by short, rather weak crenulations.

Forewing. Lengths of veins SR1:3-SR:r = 7.3:2.8:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.1:1.7:1.0 Vein 2-SR+M long, shortest distance between 1st discal cell and 2nd submarginal cell: length of vein m-cu = 1.7:1.0. Vein cu-a interstitial.

Length of fore femur: tibia: tarsus = 1.0:1.0:1.15. Length of hind femur: tibia: basitarsus = 1.94: 2.65: 1.0. Hind basitarsus 4.9 times longer than deep.

Metasoma with strong rugose sculpture. First tergite with a distinct median groove posteriorly. Posterior margin of 6th tergite very weakly emarginate. Ovipositor (part exerted beyond apex of metasoma) approximately 0.4 times length of forewing.

FIGS 41-48. Features of head: 41, *Megalommum* sp.; 42, *Ligulibracon* sp.; 43, *Eucurriea* sp.; 44, *Chaoilta* (*Chaoilta*) sp.; 45, *Gelasinibracon* sp.; 46, *Pycnobraconoides mutator* (Fabricius); 47, *Hybogaster* sp.; 48, *Euurobracon latitempus* Quicke.

Entirely honey-yellow except for antennae, hind tarsi, and ovipositor sheaths which are black or piceous. Wing membrane pale yellow tending to hyaline distally; vein C+SC+R and pterostigma piceous, remainder of venation yellowish.

DESCRIPTION (♂)

Very similar to female except smaller and posterior margin of 6th metasomal tergite only marginally emarginate and antenna dark rufous.

Ploceibracon Quicke (Figs 75, 79, 100)

Known only from the type species, *P. monstrans* Quicke, from New South Wales. The holotype of *P. monstrans* has a small dark mark indicating a trace of hindwing vein 3-CU and, together with the strong spur from fore-wing vein 3-CU1, this may indicate a relationship with *Calcaribracon*. Nothing is known of its biology.

Psittacibracon Quicke (Figs 9, 10, 132)

A rare monotypic genus of medium-sized Braconini entirely restricted to Australia. *Psittacibracon lacteolus* Quicke (Figs 9, 10) is known from a few specimens from South Australia, Western Australia and New South Wales. Nothing is known of its biology.

Pycnobraconoides gen. nov. (Figs 6, 46, 130)

TYPE SPECIES

Ichneumon mutator Fabricius 1775: 335.

DIAGNOSIS

Pycnobraconoides can be distinguished from other members of the tribe Braconini (sensu van Achterberg, 1983) by the following combination of characters: (i) head very transverse; (ii) eyes usually moderately to very setose; (iii) precoxal suture absent; (iv) hindwing vein 1r-m much shorter than vein SC+R1 (v) 2nd submarginal cell of forewing long; (vi) claws with rounded basal lobes; (vii) propodeum simple, without a mid-longitudinal carina; (viii) metasoma robust, 3rd tergite more than 2 times wider than long; (ix) ovipositor robust, without a pre-apical dorsal nodus but distinctly pre-apically expanded (Fig. 130); (x) mandibles (except for apex) white.

GENERIC DESCRIPTION

Antennae shorter than forewing, with approximately 40 flagellomeres. Terminal flagellomere acuminate. Median flagellomeres marginally longer than wide. Scapus small, shorter ventrally than dorsally in lateral aspect; not apico-medially emarginate. Labio-maxillary complex short. Mandibles ivory-white except for darker apex. Clypeus angled into hypoclypeus but without a transverse median carina: separated from face dorsally by a groove. Face smooth and shiny, setose. Eyes usually moderately to very densely setose; distinctly emarginate. Frons weakly impressed, largely setose, with a well-developed mid-longitudinal sulcus. Head very transverse; horizontal length of eye approximately 2.5 times longer than horizontal length of head behind eye.

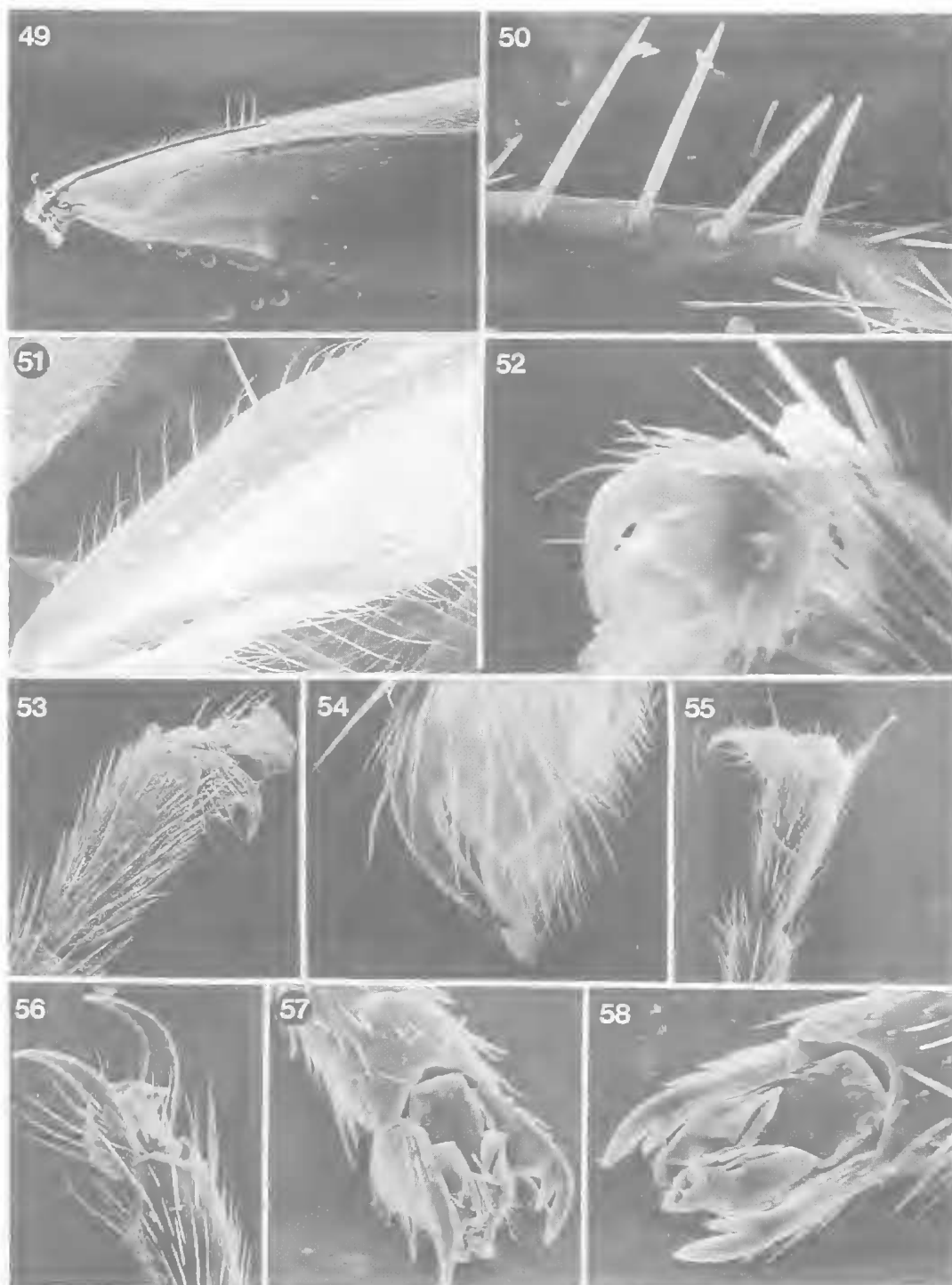
Mesosoma smooth and shiny approximately 1.3 times longer than high. Mesosotum largely glabrous except for along line of notauli. Notauli weakly impressed anteriorly, not impressed posteriorly. Scutellar sulcus narrow, crenulate. Precoxal suture absent. Mesopleural suture smooth. Median area of metanotum not carinate. Propodeum without carinae. Propodeal spiracle small, round, situated near middle of propodeum.

Forewing. Vein 1-SR+M more or less straight. Vein 2-SR+M short, more or less interstitial. Second submarginal cell long, vein 3-SR approximately 0.8 times length of vein SR1. Veins C+SC+R and 1-SR forming an angle of approximately 75°. Vein r-m unsclerotized. Vein cu-a interstitial.

Hindwing. Vein 1r-m much shorter than vein SC+R1. Apex of vein C+SC+R with only one especially thickened bristle. Base of wing evenly setose.

Claws with rounded basal lobes. Hind tibia slender, with indistinct longitudinal, lateral groove.

Metasoma short, wide, robust, largely with rugose to strong punctate sculpture but largely smooth in some species. First tergite with dorso-lateral carinae; raised median area sculptured posteriorly, strongly sloping, smooth anteriorly. Second tergite wide, with or without elongate median area (defined largely by difference in sculpture); anterolaterally with a pair of longitudinal, sub-parallel grooves. Tergites 3 to 5 with posterior margins rounded in profile, rarely 5th with a weak transverse, subposterior groove. Ovipositor robust, pre-apically smoothly expanded pre-apically (Fig. 130), ventral valves without or with extremely reduced serrations; part exerted



FIGS 49-58. 49-51, apex of hindwing vein C+SC+R showing specialised bristles: 49, *Megalommum*.; 50, *Callibracon* sp.; 51, *Bracon* sp. 52-58, features of claws: 52, *Calcaribracon willani* sp.nov.; 53, *Bracon* sp.; 54, *Mysosoma* sp.; 55, *Ligulibracon* sp.; 56, *Euurobracon* sp.; 57-58, *Macrobracon* sp.

beyond apex of metasoma slightly shorter than medial length of metasomal tergite 2+3.

MALES

Very similar to females. Intergal metasomal glands well-developed with a pair of large sac-like reservoirs (Quicke, 1990). Genitalia: digitus with a single apical tooth; parameres with only a single row of setae apically.

BIOLOGY

From many, largely unpublished, records it is clear that *Pycnobraconoides* gen.nov. is a specialised parasitoid of cryptocephaline chrysomelid beetle larvae (Quicke, 1988b). The beetle larvae (and pupae) live in a case from which single specimens of *Pycnobraconoides* commonly emerge. The following cryptocephalines have been recorded as hosts of various species of *Pycnobraconoides*: '*Cadmus*' *aurantiacus*, *Cryptocephalus speciosus*, *Lachnabothra* sp., and *Prasonotus* sp. It is presumed but not proven that *Pycnobraconoides* is ectoparasitic.

DISCUSSION

Pycnobraconoides gen.nov. appears to be most closely related to the oriental genus *Pycnobracon* Cameron which was originally described from India (Cameron, 1902), and recently members of the new genus have been dealt with under *Pycnobracon*. However, it has been recognised for some time that the Australian representatives do not fit well in *Pycnobracon*. Indeed, Quicke (1987b) considered *Pycnobracon* to comprise two sections: those keying out at couplet 108 (loc. cit.), which are referable to *Pycnobracon* sensu stricto; and those keying out at couplets 90 and 94, which are placed here under *Pycnobraconoides* gen.nov. In particular, *Pycnobraconoides* differs from *Pycnobracon* in having a robust ovipositor without a pre-apical dorsal nodus and an extremely transverse head. The biologies of the two genera also differ considerably with *Pycnobracon* sensu stricto parasitic on pyralid moth larvae while *Pycnobraconoides* attacks case-bearing Chrysomelidae (see above). Within Australia, the new genus is widely distributed and specimens representing a small number of species have been seen from Australian Capital Territory, Queensland, New South Wales, Tasmania and Western Australia.

INCLUDED SPECIES

Pycnobraconoides froggattii (Cameron) comb.nov.

(= *Bracon froggattii* Cameron, 1911: 339); holotype in BMNH examined.

Pycnobraconoides mutator (Fabricius) comb. nov. (= *Iphiaulax bipartitus* Szépligeti 1905:35; junior subjective synonym, Quicke, 1991c).

**Rostraulax* Quicke (Fig. 104)

Rostraulax species are medium-sized wasps found primarily in Indonesia and New Guinea. One species, *R. xanthocephalus* (Turner), is found in Queensland and northern New South Wales rainforests as well as in Papua New Guinea. Nothing is known of the biology of *Rostraulax* but the apparently related genus *Cratobracon* has been reared from wood-boring cerambycid larvae (Quicke, unpubl. obs.). *Rostraulax* is very closely related to *Shelfordia* Cameron and may need to be synonymized with that genus (van Achterberg, pers. comm.).

Serratobracon Tobias (Figs 83, 85, 107)

This genus is known from only a single specimen from the Northern Territory which has a highly characteristic combination of pedicellus and scapus morphology. Its affinities were discussed by Tobias in Quicke & Tobias (1990), who concluded that it may be related to either *Sylviobracon* Quicke or to the *Atamycolus* group of genera (Quicke, 1987b). However, neither of these placements is satisfactory and more material needs to be studied.

Simplicibracon Quicke (Figs 5, 76, 102)

Previously, species of this genus were only known from Taiwan (Quicke, 1988e) and Japan (Maetô, 1991). In addition to these and the new Australian species, the senior author has seen specimens of another new species from Fiji. In *Simplicibracon*, the strongly developed transverse median clypeal carina (Fig. 76) is quite distinctive and most species (except for two seen from Japan) have hind wing vein 2-SC+R slightly transverse. The one species for which the biology is known, *S. curticaudis* Maetô, is a parasitoid of leaf-galling Cecidomyiidae on broad-leaved, evergreen trees (Maetô, 1991).

Key to the species of *Simplicibracon* (♀ ♀ only)

1. Hindwing vein 2-SC+R longitudinal (see Fig. 101); ovipositor (part exerted beyond apex of metasoma) less than 0.25 times length of forewing; metasomal tergites unicolorous brownish yellow to yellowish brown; 2nd metasomal tergite less than 1.8 times wider than medially long *S. curticaudis* Macleod
- Hindwing vein 2-SC+R transverse (Fig. 102); ovipositor (part exerted beyond apex of metasoma) more than 0.25 times length of forewing; metasomal tergites brownish yellow to whitish yellow, marked with brown or black blotches on tergites 2 and 3 or 3 and 4; 2nd metasomal tergite more than 1.8 times wider than medially long 2
2. Notauli crenulate; metasomal tergites metasomal tergites 5-7 yellow-brown, same as tergites 1 and 2 *S. maculigaster* Quicke
- Notauli smooth; metasomal tergites 5-7 cream-white, different from tergites 1 and 2 *S. nigratarsus* sp. nov.

***Simplicibracon nigratarsus* sp. nov.**
(Figs 5, 76, 102)

MATERIAL EXAMINED

HOLOTYPE: ♀ with the following labels: '15.418 145.12E Annan Riv. 3Km WhyS Black Mt. 26-27 Apr. 1981Q, I.D. Naumann ex ethanol' & 'collected at light'. Deposited in ANIC.

DESCRIPTION (♀)

Length of body 4.2mm, of fore wing 4.6mm, of ovipositor (part exerted beyond apex of metasoma) 1.9mm, and of antenna 4.1mm.

Antennae with 32 flagellomeres. First flagellomere 1.3 times longer than both the 2nd and 3rd separately, the latter being 1.5 times longer than wide. Transverse median clypeal carina strongly protruding. Height of clypeus (upper part): intertentorial distance: tentorio-ocular distance = 1.0:1.82:1.63. Face shiny with moderately well-developed punctures at the bases of the setae. Height of eye (measured parallel to face): width of face: width of head = 1.0:1.18:2.36. Face 2 times wider than high. Eyes weakly setose. Frons without a mid-longitudinal ridge; weakly impressed. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.43:1.0:3.14.

Mesosoma 1.24 times longer than high. Pronotum largely smooth and shiny with narrow crenulate groove laterally. Mesonotum moderately

setose posteriorly and laterally but anterior third of middle lobe virtually glabrous. Notauli moderately impressed, not crenulate. Precoxal suture represented by only a weak rounded depression.

Forewing. Lengths of veins SR1:3-SR:r = 5.6:1.9:1.0. Lengths of veins 2-SR: 3-SR: r-m = 1.6:1.9:1.0. Vein r-m with only a single posterior bulla and associated flexion line. Length of vein m-cu: shortest distance between 1st subdiscal cell and 2nd submarginal cell = 0.8:1.0.

Hindwing. Base of wing more or less evenly, densely setose. Vein 2-SC+R distinctly transverse. Apex of vein C+SC+R with only one especially thickened bristle.

Lengths of fore femur: tibia: tarsus = 1.0:1.13:1.3. Fore tibia moderately densely with strong spine-like setae antero-laterally. Lengths of hind femur: tibia: basitarsus = 1.8:2.55:1.0. Hind tibia very robust, 6.1 times longer than maximally deep. Hind basitarsus 4.4 times longer than deep.

Metasoma with rugulose sculpture. Second tergite 2.1 times wider than medially long. Ovipositor (part exerted beyond apex of metasoma) approximately 0.4 times length of forewing.

Brownish yellow except for the following: antennae, hind tibia except extreme base, hind basitarsus, a pair of large submedial marks on the 3rd and 4th tergites, ovipositor sheaths, black. Lateral parts of 3rd and 4th tergites and all except for a mid-longitudinal yellow line on tergites 5 to 7, white. Wings pale smoky brown with brown venation.

NOTE

The holotype of *S. nigratarsus* sp. nov. is the same specimen as referred to by Quicke (1992).

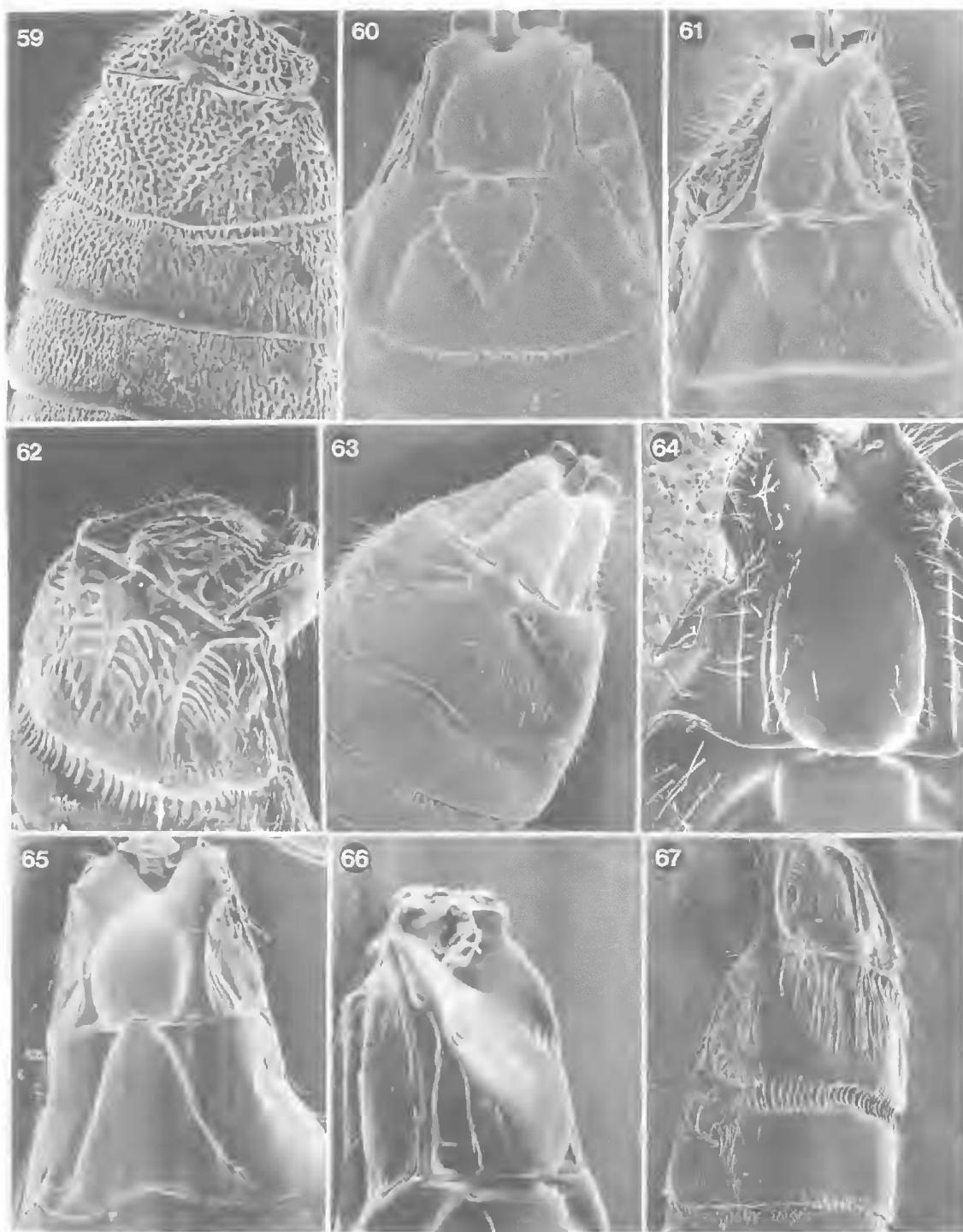
***Stenobracon* Szépligeti**
(Fig. 93)

Synonyms. *Elphea* Cameron; *Phanaulax* Cameron

A small genus of medium-sized wasps belonging to the tribe Bathyaulacini. One probably undescribed species is found in the north of Western Australia in the Kimberleys. Elsewhere, *Stenobracon* spp. are important parasitoids of Lepidoptera larvae that bore in stems of grain crops (Quicke, 1983; 1988c) but nothing is known about the biology of the Australian species.

***Stigmatobracon* Turner**
(Figs 1, 131)

A small genus of medium-sized to large wasps.



FIGS 59-67. Features of the metasoma: 59, *Tropobracon* sp. (African) T1-T4; 60, *Eunesaulax* sp., T1-T2; 61, *Megalomum* sp., T1-T2; 62, *Campyloneurus* sp., Tj1-T2; 63, *Iphiaulax* sp., T1-T3; 64, *Callibracon* sp., T1; 65, *Virgulibracon* sp., T1-T2; 66, *Vomeribracon* sp., T1; 67, *Hybogaster* sp., T1-T4.

A key to the four described species, all from Australia, is provided by Turner (1918). However, the senior author has seen a female of *S. xanthostigma* Turner from Papua New Guinea and also males with somewhat different colouration also from Papua New Guinea. These may represent a new species, though the possibility of sexual dimorphism in this group cannot be ruled out. Nothing is known of their biology though one species has been collected amongst mangroves (*Rhizophora*) in north Queensland, and other specimens have been collected in the Northern Territory, Victoria and Western Australia.

Testudobracon Quicke
(Figs 116-120)

Small wasps belonging to the Braconini. Only a few species have been described but we are aware of many undescribed ones from both Africa and the Indo-Australian region. *Testudobracon* species are apparently specialist ectoparasitoids of gall-forming, cecidomyiid Diptera, especially — and perhaps exclusively — Asphondyliini (Quicke 1986a; Maetô, 1991). This is also partly confirmed by an Australian host record for the genus, based on an apparently undescribed species represented in the QDPI collection, which had been reared from a gall on '*A. polycarpa*'.

Key to the species of *Testudobracon* (♀ only)

1. Median emargination of 6th metasomal tergite shallow and with rounded lateral margins (Fig. 120); ovipositor (exserted part) at least 0.75 times length of forewing; precoxal suture (if distinguishable), represented by a weak, complete, narrow, longitudinal groove 2
- Median emargination of 6th metasomal tergite deep and with sharply defined (angular) lateral margins (Figs 117, 118); ovipositor (exserted part) less than 0.75 times length of forewing; precoxal suture present as a deep, smooth, rounded pit 3
2. Hind leg almost entirely pale yellow-brown; metasomal tergites 4-6 largely whitish, except for basal (anterior) third which is yellowish and postero-lateral lobes which are somewhat darker; vertex with distinct fine transverse, striate sculpture; metasomal tergites 4-6 rugulose *T. longicaudis* Maetô
- Hind leg almost entirely black; metasomal tergites 4-6 with basal (anterior) half black or piceous brown, and posterior half white; vertex totally smooth and shiny; metasomal tergites 4-6 irregu-

- larly punctate (Fig. 120) *T. australicollis* sp. nov.
3. Postero-lateral margin of 6th metasomal tergite with a pointed protuberance (Fig. 116) 4
 - Postero-lateral margin of 6th metasomal tergite with a rounded lobe-like protuberance (Fig. 119) 5
 4. Middle lobe of mesoscutum largely glabrous except for line of notauli; body and legs virtually entirely brownish yellow *T. unicolor* sp. nov.
 - Middle lobe of mesoscutum largely setose (except for anterior face); body and legs commonly with black or piceous markings especially frons, vertex, part of mesopleuron, metanotum and propodeum, middle coxae and hind coxa and hind femur *T. pleuralis* (Ashmead)
 5. Body and legs (except telotarsi) entirely pale brownish yellow; postero-lateral margin of 6th metasomal tergite hardly produced *T. tatyanae* sp. nov.
 - Body and hind legs extensively marked with black and dark reddish-brown, metasoma with obvious pattern of dark red, black and white *T. niger* Quicke

Testudobracon australicollis sp. nov.
(Fig. 120)

MATERIAL EXAMINED

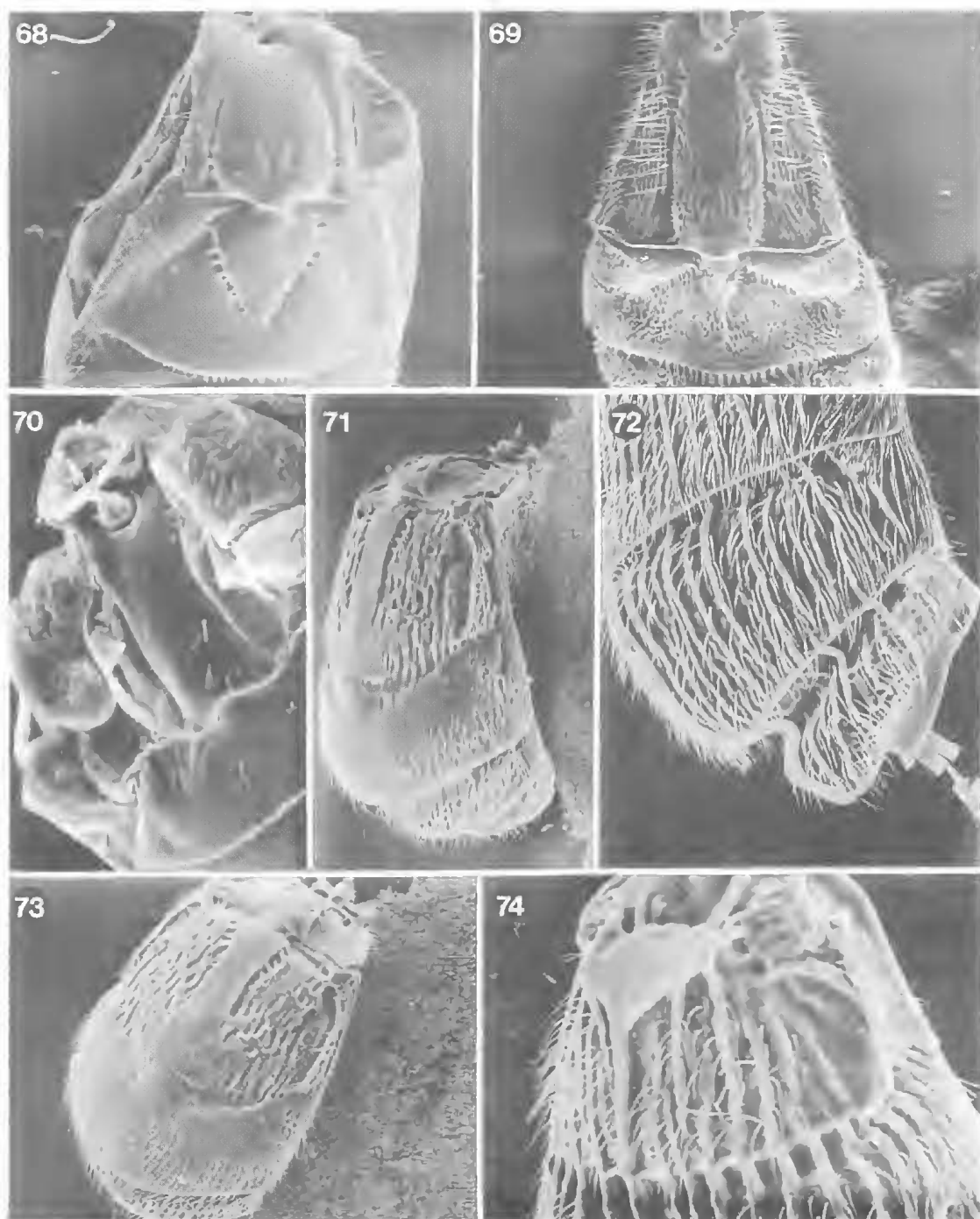
HOLOTYPE: ♀ with following labels: 'Mackay Queensland 1909-45', '834' & 'Mackay 3.92'. In collection of BMNH.

DESCRIPTION (♀)

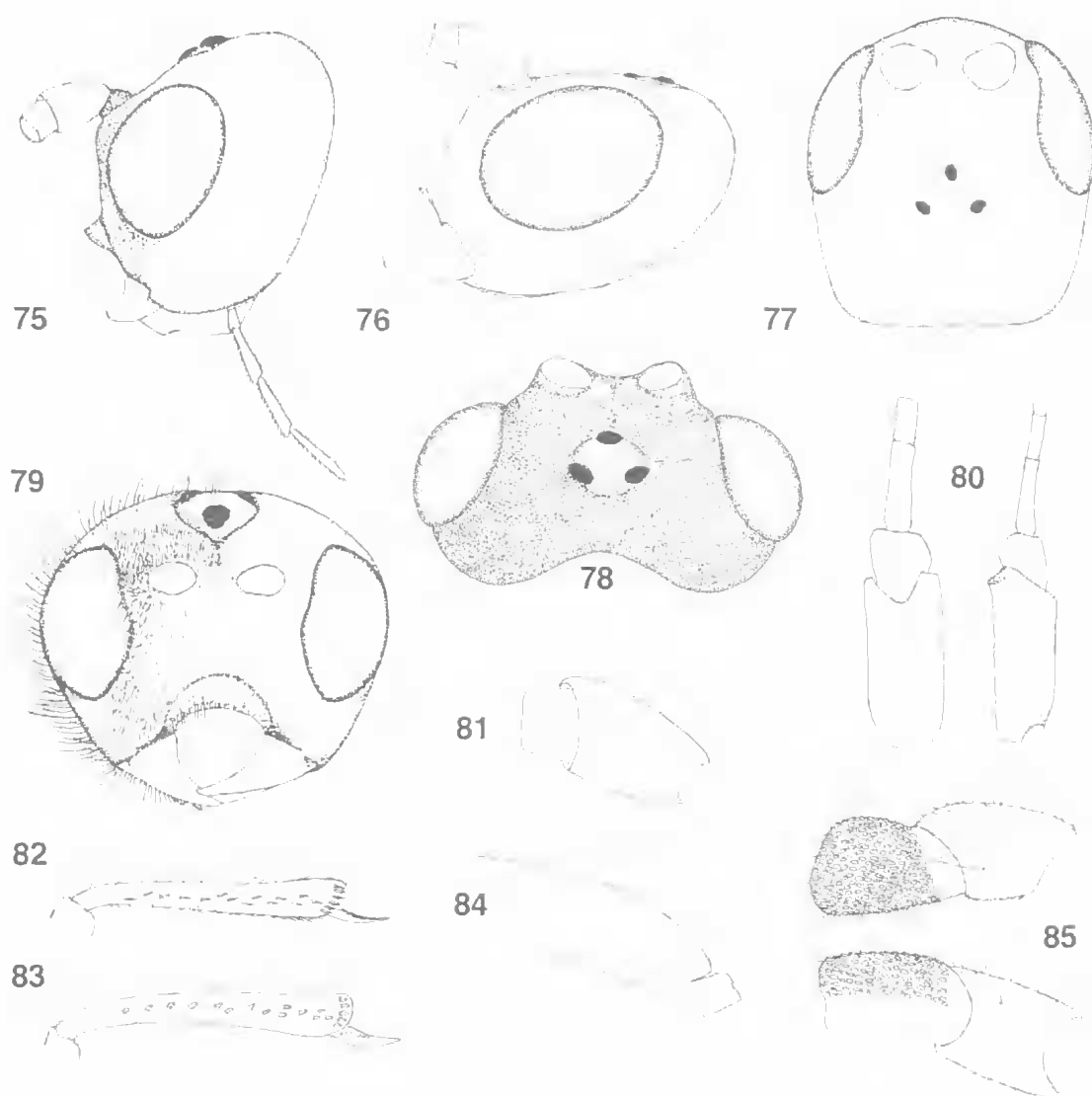
Length of body 3.7 mm, of forewing 3.6 mm and of ovipositor (part exserted beyond apex of metasoma) 2.9 mm.

First flagellomere 1.1 times longer than both the 2nd and 3rd separately, the latter being 1.8 times longer than wide. Height of clypeus: intertentorial distance: tentorio-ocular distance = 1.0:2.2:1.58. Malar space 0.23 times height of eye. Face smooth and shiny medially, finely coriaceous laterally, without an obvious mid-longitudinal ridge. Height of eye: width of face: width of head = 1.0:1.1:2.1. Eyes sparsely short setose. Frons finely coriaceous medially, smooth and shiny laterally. Shortest distance between posterior ocelli: transverse diameter posterior ocellus: shortest distance between posterior ocellus and eye = 1.65:1.0:3.5. Horizontal length of eye 2.6 times horizontal length of head behind eye.

Mesoscutum smooth and shiny, setosity largely restricted to line of notauli. Precoxal suture rep-



FIGS 68-74. Features of the metasoma: 68, *Eunesaulax* sp., T1-T2; 69, *Chaoilta* (*Blastomorpha*) *decorata* Szépligeti, T1-T2; 70, *Myosoma* sp. (Indo-Australian), T1; 71, *Gelasinibracon* sp., T1-T5; 72, *Hyboteles* sp., T5-T6; 73, *Gelasinibracon* sp., T1-T3; 74, *Hyboteles* sp., T1.



FIGS 75-85. Features of head, mesosoma and legs: 75, *Ploceibracon monstrans* Quicke; 76, *Simplicibracon nigratarsus* sp.nov.; 77, *Atanycolus australiensis* sp.nov.; 78, *Pedinopleura australiensis* sp.nov.; 79, *Ploceibracon monstrans* Quicke; 80, *Atanycolus australiensis* sp.nov., base of antenna, dorso-lateral and dorsal aspects; 81, *Furcadesha walteri* sp.nov., scapus, lateral aspect; 82, *Atanycolus australiensis* sp.nov., fore tibia; 83, *Serratobracon cardaleae* Tobias, fore tibia; 84, *Atanycolus australiensis* sp.nov., profile mesoscutum and pronotum; 85, *Serratobracon cardaleae*, scapus and pedicellus, lateral and dorsal aspects.

resented by a complete but very weak, smooth, longitudinal groove.

Length of forewing veins SR1:3-SR:r = 5.2:2.8:1.0. Lengths of veins 2-SR:3-SR:r-m = 2.1:3.1:1.0.

Lengths of fore femur: tibia: tarsus = 1.05:1.0:1.2. Lengths of hind femur: tibia: basitarsus = 2.5:3.1:1.0. Hind tibia 5.7 times longer than wide.

Second metasomal tergite 2.7 times wider than medially long, with weak parallel-sided, smooth narrow median area, and with posteriorly converging, antero-lateral, longitudinal grooves nearly reaching posterior margin. Third tergite 2.9 times wider than medially long. Tergites 3 to 6 with weakly-developed, rounded postero-lateral lobes. Sixth tergite weakly emarginate me-

dially. Ovipositor approximately 0.8 times length of forewing.

Head, mesosoma fore and mid legs pale brownish orange except for piceous mark on top of head. Median parts of metasomal tergites 1-3 broadly brown to piceous, laterally whitish. Tergites 4-6 basally piceous brown, posteriorly white. Hind legs black. Wings pale brown with light to dark brown venation.

***Testudobracon unicolorus* sp. nov.**
(Figs 116, 117)

MATERIAL EXAMINED

HOLOTYPE: ♀ with following labels: 'S.E. Queensland, Tamborine Mts. 19-26. iv. 1935' and 'AUSTRALIA: R.E. Turner B.M. 1935-240'. In BMNH collection.

DESCRIPTION (♀)

Length of body 2.6mm, of forewing 2.9mm and of ovipositor (part exerted beyond apex of metasoma) 1.7mm.

First flagellomere 1.2 and 1.4 times longer than the 2nd and 3rd respectively, the latter being 1.7 times longer than wide. Height of clypeus: intertentorial distance: tentorio-ocular distance = 1.0: 2.3: 1.7. Face largely finely coriaceous. Height of eye: width of face: width of head = 1.0: 1.1: 2.05. Eyes glabrous, not emarginate. Top of head shiny. Shortest distance between posterior ocelli: transverse diameter posterior ocellus: shortest distance between posterior ocellus and eye = 1.2: 1.0: 2.9. Horizontal length of eye 2.5 times horizontal length of head behind eye.

Mesosoma approximately as long as high. Notauli weak but distinct along whole length. Mesoscutum setose medio-posteriorly, along line of notauli and laterally. Precoxal suture represented by a deep pit.

Lengths of veins SR1:3-SR:r = 6.72: 2.5: 1.0. Lengths of veins 2-SR:3-SR:r-m = 1.25: 1.75: 1.0. Pterostigma 3.0 times longer than maximally wide.

Lengths of fore femur: tibia: tarsus = 1.0: 1.0: 1.27. Lengths of hind femur: hind tibia:

hind basitarsus = 2.3: 2.75: 1.0. Hind tibia 6 times longer than maximally deep. Hind basitarsus 4.4 times longer than deep.

Second metasomal tergite 2.47 times wider than medially long; more or less uniformly foveate rugose, without mid-basal area and with only weak sub-lateral grooves anteriorly. Third tergite 2.57 times wider than medially long. Tergites 3-5 with well-developed, rounded, postero-lateral lobes. Tergite 6 postero-laterally with a pointed prominence and medially deeply semicircularly incised.

Uniformly pale brownish yellow except antennae and ovipositor sheaths which are black. Wings very pale brown with dark brown venation.

***Testudobracon tatyanae* sp. nov.**
(Fig. 118)

MATERIAL EXAMINED

HOLOTYPE: ♀ with following labels: 'Mackay, Queensland. 1909-45.' and 'Mackay 1.01'. The type specimen is the right hand of two braconids glued to a single card square, in the BMNH collection.

DESCRIPTION (♀)

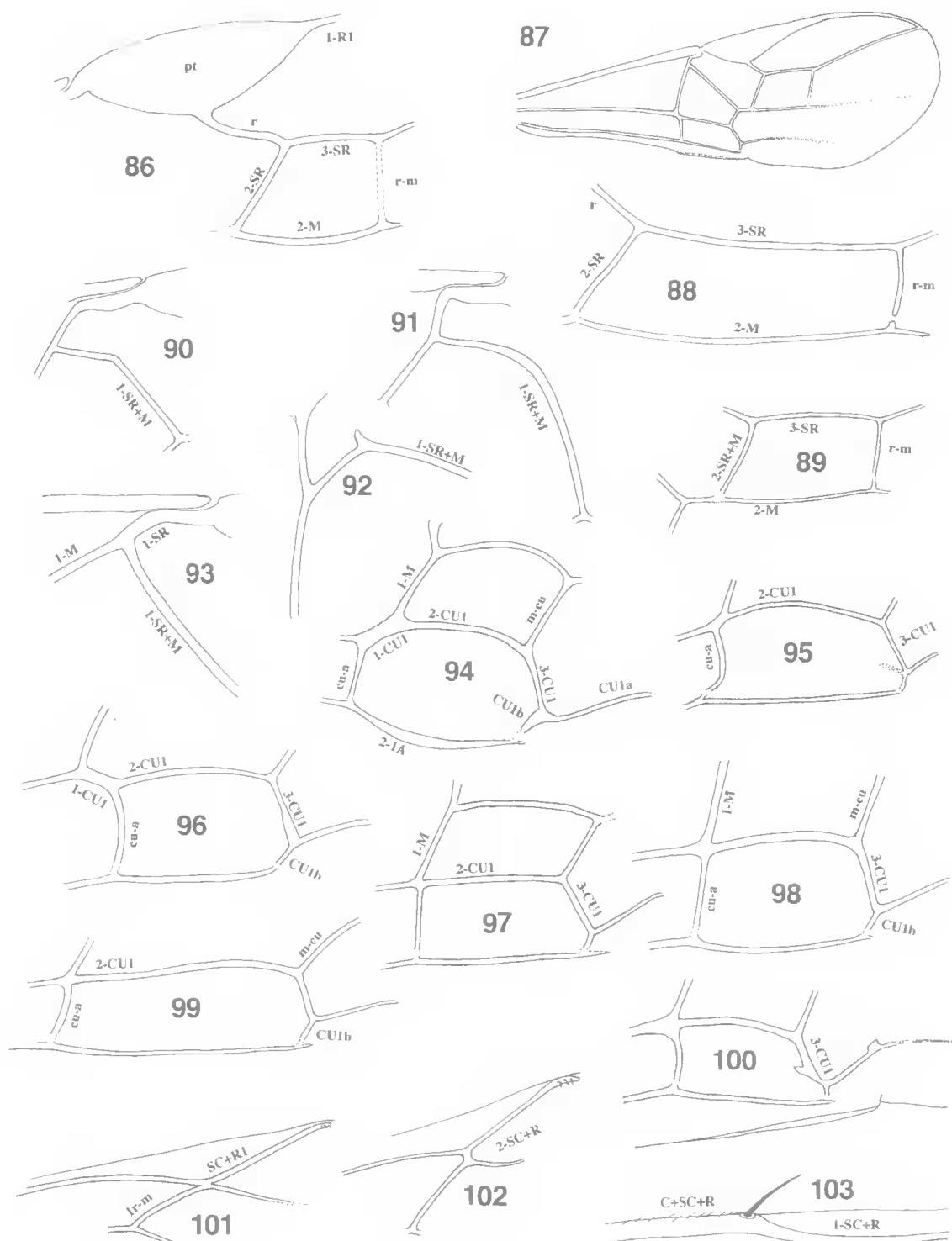
Length of body 2.25mm, of forewing 2.9mm, of ovipositor (part exerted beyond apex of metasoma) 1.6mm, and of antenna 2.6mm [face not visible, glued on to card].

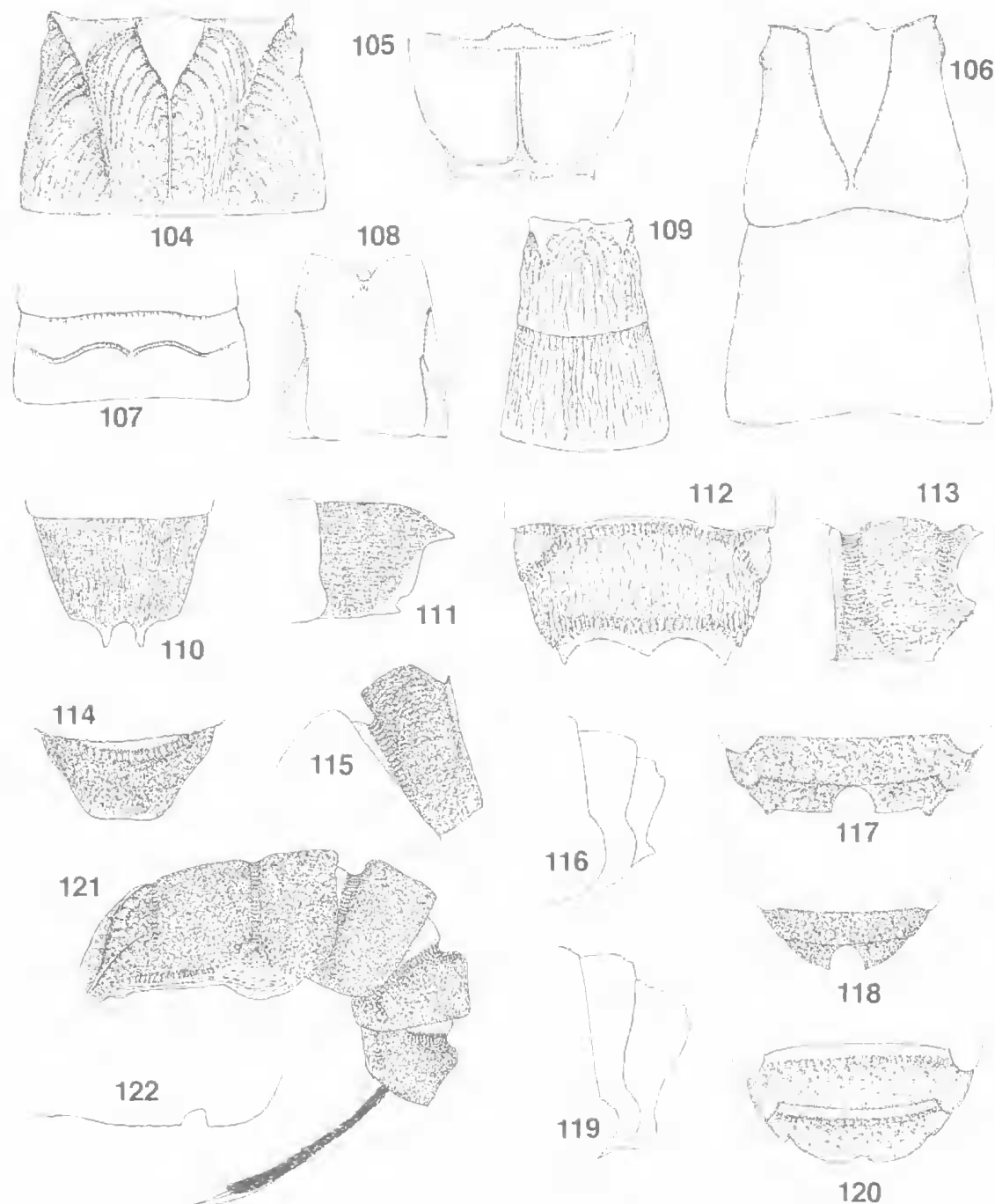
Antennae with 23 flagellomeres. Terminal flagellomere 2 times longer than wide. First flagellomere 1.1 times longer than both the 2nd and 3rd separately, the latter being 1.7 times longer than wide. Head very transverse. Horizontal length of eye 2.3 times longer than horizontal length of head behind eye. Vertex and temples smooth and shiny.

Mesosoma 1.15 times longer than high. Mesoscutum setose medio-posteriorly and along lines of notauli, otherwise smooth, shiny and glabrous. Precoxal suture represented by a smooth, deep, circular pit.

Lengths of forewing veins SR1:3-SR:r =

FIGS 86-103. Features of wing venation: 86, *Habrobracon* sp., pterostigma and 2nd submarginal cell; 87, *Trigastrotrothea tricolor* sp. nov., 2nd submarginal cell; 88, *Ligulibracon levor* Quicke; 89, *Furcadesha walteri* sp. nov., forewing vein 1-SR+M; 90, *Vomeribracon* sp.; 91, *Calcaribracon willani* sp. nov.; 92, *Virgulibracon endoxylaphagus* sp. nov.; 93, *Stenobracon* sp., 94-100, 1st subdiscal cell; 94, *Cedilla cedilla* Quicke; 95, *Calcaribracon willani* sp. nov.; 96, *Eurobracon latitempus* Quicke; 97, *Eumesaulex terebrator* Tobias; 98, *Vipiellus* sp.; 99, *Paranesaulex* sp. nr. *nitor*; 100, *Ploceibracon monstrans* Quicke; 101-102, junction of hindwing veins 1r-m and SC+R1, to show orientation of 2-SC+R (between these): 101, *Gelasinibracon* sp.; 102, *Simplicibracon nigratarsus* sp. nov.; 103, *Atanycolus australiensis* sp. nov., apex of hindwing vein C+SC+R.





FIGS 104-122. Features of abdomen: 104, *Rostraulax xanthocephalus* (Turner), T2; 105, *Hyboteles toxopeusi* van Achterberg, propodeum; 106, *Paranesaulax* sp., T1-T2; 107, *Serratobracon cardaleae* Tobias, T3; 108 *Vomeribracon* sp., T1; 109, *Africadesha tobiasi* sp.nov., T2-T3; 110-111, *Furcadesha walteri* sp.nov., T5; 112-113, *Trigastrotheca tricolor* sp.nov., T5; 114, *Pedinopleura australiensis* sp.nov., T6; 115, *Hyboteles toxopeusi* van Achterberg, T6; 116, 117 *Testudobracon unicolorus* sp.nov., T5-T6; 118, *Testudobracon tatyanae* sp.nov., T5-T6; 119-120, *Testudobracon australicolorus* sp.nov., T5-T6; 121, *Pedinopleura australiensis* sp.nov.; 122, *Pedinopleura emarginata* van Achterberg, profile of lateral margin of syntergite T1-T3.

5.7:2.0:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.47:1.53:1.0.

Lengths of fore femur: tibia: tarsus = 1.0: 1.05: 1.5. Lengths of hind femur: tibia: basitarsus = 2.8: 3.1: 1.0. Hind tibia 5.8 times longer than maximally deep. Hind basitarsus 3.8 times longer than deep.

Metasoma more elongate than typical *Testudo-bracon*. Second tergite 2.1 times wider than medially long; without mid-basal area but with moderately-developed sub-lateral grooves. Third tergite 2.25 times wider than medially long. Tergites 3 to 5 with very weak, rounded postero-lateral lobes. Sixth tergite with a deep, semi-circular medial emargination.

Entirely pale brownish yellow except for antennae and ovipositor sheaths which are black and telotarsi which are slightly darkened. Wings weakly infuscate with brown venation.

ETYMOLOGY

Named after the senior author's wife Tanya for her tolerance of things hymenopterological.

****Trigastrotheca* Cameron**
(Figs 3, 13, 87, 112, 113)

Synonyms. *Coelodontus* Roman; *Odontopygia* Enderlein.

This is a small but widely-distributed genus originally described from Africa (*T. trilobata* Cameron) but is also known from India, the Philippines (Quicke, 1987b) and now Australia. Nothing is known of the biology of this group of Braconini though members of the closely related genus *Kenema* van Achterberg have been collected on several occasions from fields of grain crops.

Key to non-African species of *Trigastrotheca* (♀ ♀ only)

1. Forewing vein 3-SR more than 1.4 times longer than vein r-m; mesosoma uniformly orange; 2nd metasomal tergite unicolorous, ivory white; 3rd to 5th metasomal tergites orange. *T. tricolor* sp.nov.
- Forewing vein 3-SR less than 1.25 times longer than vein r-m; mesosoma black, marked with ivory white; 2nd metasomal tergite black medially, white laterally; 3rd to 4th metasomal tergites largely black, 5th ivory white *T. tridentata* (Enderlein)

***Trigastrotheca tricolor* sp.nov.** (Figs 3, 87, 112, 113)

MATERIAL EXAMINED

HOLOTYPE: ♀ with following labels: '7-14m. W. of Herberton, via Watsonville' and 'N. Queensland. 1 May 1967 D.H. Colless'. In ANIC collection.

PARATYPE: ♀ with same data as holotype. ANIC.

DESCRIPTION (♀ ♀)

Length of body 4.1 mm, of forewing 4.2 mm and of ovipositor (part exerted beyond apex of metasoma) 1.3 mm.

Antenna with 40 flagellomeres. Terminal flagellomere acuminate, 2.1 times longer than wide. Penultimate flagellomere 1.3 times longer than wide. Median flagellomeres 1.3 times longer than wide. First flagellomere as long as the 2nd and 3rd separately, the latter 1.7 times longer than wide. Height of clypeus: inter-tentorial distance: tentorio-ocular distance = 1.0: 2.5: 2.0. Face finely punctate to coriaceous, otherwise shiny. Malar suture narrow but well-developed. Height of eye: width of face: width of head = 1.0: 1.2: 2.3. Frons flat without a mid-longitudinal ridge or lamella. Top of head finely coriaceous. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance between posterior ocellus and eye = 1.3: 1.0: 2.5.

Mesosoma 1.46 times longer than high, largely with punctate sculpture on background of punctulate sculpture. Pronotum with finely crenulate groove. Notauli distinctly impressed along whole length of mesoscutum. Pre-scutellar sulcus narrow, with 6-7 crenulae. Scutellum rather flat, with reduced sculpture. Precoxal suture weak. Posterior margin of propodeum crenulate.

Forewing. Lengths of veins SR1:3-SR:r = 5.5:2.05:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.15:1.5:1.0. Vein r issuing approximately 0.4 distance from base pterostigma. Vein 2-SR+M long, 0.3 times length of 2-M. Vein cu-a interstitial, straight, perpendicular.

Hindwing. Apex of vein C+SC+R with one especially thickened bristle. Base of wing with a glabrous area.

Claws with rounded basal lobes. Length of fore femur: tibia: tarsus = 1.0: 1.1: 1.2. Length of hind femur: tibia: basitarsus = 2.2: 3.0: 1.0. Hind tibia moderately slender without an obvious longitudinal, lateral groove.

Metasomal tergites 1-5 foveate rugose. Tergite 1 with ill-defined dorsal carinae. Tergites 3-5 with well-developed antero-lateral areas. Ovipositor (part extending beyond apex of meta-

soma) approximately 0.3 times length of forewing.

Largely yellow-brown (ochreous) except for the following: antennae black; head piceous brown with palps, labio-maxillary complex, labrum, mandibles except apex and two large, sub-rectangular areas laterally on the frons to temple area, pinkish ivory; two lines along the notauli, the posterior half of the middle lobe of the mesoscutum and the scutellum paler ochreous than remainder of mesosoma; propleuron piceous brown; mid- and posterior legs piceous brown with the junction between femur and tibia, and the tarsi paler brown; first and second metasomal tergites, the antenno-lateral areas of the third tergite and a narrow posterior margin of the two semi-circular emarginations of the fifth tergite, ivory white; postero-lateral corners of fifth tergite piceous; ovipositor sheaths black. Wings pale brown, slightly darker apically; venation dark brown except extreme base of pterostigma which is whitish.

Tropobracon Cameron
(Figs 15, 59)

Synonym: *Shirakia* Viereck

Small species of Braconini distributed from Australia (Queensland) to India and Africa and also occurring in the Palaearctic Region (China). Elsewhere, *Tropobracon* species have frequently been reared from pyralid moth larvae boring in stems of grain crops including rice. The occurrence of the genus in Australia was noted by Quicke (1988b).

Undabracon Quicke
(Fig. 125)

A small genus of small to medium-sized Aphrastobraconini. Only two species have been described, *U. nigrithorax* Quicke from Australia and *U. sinuatus* (Baltazar) from the Philippines though we have seen two other undescribed species from Australia. Nothing is known of the biology of *Undabracon* though they are apparently nocturnal or crepuscular in habit (Quicke, 1992). Their arched ovipositor is reminiscent of that of another braconine genus, *Zaglyptogastra* Ashmead, which includes Afrotropical species

that attack twig-boring cerambycid beetle larvae, probably through frass holes (Quicke, 1991b). One Australian species has been observed flying near fallen wood.

Vipielus Roman
(Figs 25, 98)

The species of *Vipielus* are small to medium-sized braconines found only in Australia. *Vipielus* is closely related to the genera of Aphrastobraconini though it typically lacks the distinctive thickening of forewing vein Cu1b. Species of *Vipielus* have been reared several times from stem-boring xyloxyctid larvae (Lepidoptera) including the macadamia twig-girdler, *Neodrepta luteotactella* (Walker).

***Vipiomorpha** Tobias
(Fig. 16)

Although *Vipiomorpha* was originally described on the basis of a Russian species, *V. ypsilon* Tobias, apparently congeneric species occur in Africa and Australia. *Vipiomorpha* spp. are rather small members of the Glyptomorphini and are the only representatives of that tribe so far found in Australia, we know of a large number of undescribed species. Within the Glyptomorphini, *Vipiomorpha* is rather unspecialized and is probably fairly close to the basal stock of that tribe. Nothing is known of the biology of *Vipiomorpha* but other Glyptomorphini are predominantly parasitoids of concealed Coleoptera larvae.

Virgulibracon Quicke
(Figs 19, 65, 92, 137, 138)

Virgulibracon is a small genus of large, entirely Australian wasps. Nothing is known of the biology of the type-species, *Virgulibracon vulsus* Quicke. However, *V. endoxylaphagus* sp. nov., is a common and widespread species that parasitizes larvae of the cossid moth *Endoxyla* (= *Xyleutes* of Authors), which bores in *Eucalyptus* trunks and branches (see above). We have seen specimens of apparently the same species from all over Australia but, because some differences in coloration have been observed, it is possible that there may be several similar species involved. In addition,

FIGS 123-138. Features of the ovipositor: 123, *Ligulibracon* sp.; 124, *Cedilla cedilla* Quicke; 125, *Undabracon* sp.; 126, *Curriea* sp.; 127, *Paranesaulax* sp.; 128, *Hybogaster* sp.; 129, *Iphiaulax* sp.; 130, *Pachobraconoides froggattii* (Cameron) n. comb. 131, *Stigmatobracon* sp. 132, *Psittacibracon lacteolus* Quicke; 133, *Mollibracon bimaris* (Turner). 134, *Africadesha tobiasi* sp. nov., 135, *Eunesaulax terebratus* Tobias; 136, *Eunesaulax* sp.; 137, 138, *Virgulibracon endoxylaphagus* sp. nov., paratype, lower valves retracted



tion, several other undescribed species vary in the number of hamuli on hindwing vein C+SC+R, wing and metasomal coloration and the development of a spur from forewing vein 3-CU1. These wasps bore through solid wood to a depth of more than 4cm to reach their hosts (see van Achterberg, 1986).

Key to species of *Virgulibracon*

1. Metasoma, fore and mid legs and pterostigma entirely black; ovipositor (part exerted beyond apex of metasoma) less than 2.25 times longer than forewing *V. vulsus* Quicke
- Metasomal tergites 1-3 (at least) fore and mid legs and pterostigma orange to brownish orange; ovipositor (part exerted beyond apex of metasoma) more than 2.35 times length of forewing *V. endoxylaphagus* sp.nov.

Virgulibracon endoxylaphagus sp.nov. (Figs 19, 92, 137, 138)

MATERIAL EXAMINED

HOLOTYPE: ♀ with following data label: 'St Lucia, S.E. Queensland 8 Sep 1990. Ovipositing into *Endoxyla* (= *Xyleutes* of Authors) *cinereus* prepupa'. Deposited in QMBA.

PARATYPES: 3 ♀ ♀ with same data as holotype, 2 ♀ and 11 ♂ paratypes with following data label: 'St Lucia S.E. Queensland, 1 Sep 1990, G.B. Monteith. Emerging from *Xyleutes* Hole in 6' *Eucalyptus tereticornis* at 9.00 am'. All in QMBA except 1 ♀ and 1 ♂ in Quicke Collection, Sheffield.

DESCRIPTION (♀ ♀)

Length of body, 14.5-16.5mm, of forewing 16.0-17.0mm and of ovipositor 41-47mm.

Antenna with approximately 95 flagellomeres. Terminal flagellomere partly fused to the penultimate flagellomere. First flagellomere 1.5 and 1.8 times longer than the 2nd and 3rd flagellomeres respectively. 3rd flagellomere approximately as long as wide. Malar area shallowly depressed, finely coriaceous. Height of clypeus: inter-tentorial distance: tentorio-ocular distance = 1.0:6.0:3.8; clypeus without a transverse median carina, the lower part curved inwards to form roof of hypoclypeal depression. Face shiny with some punctuation. Height of eye: width of face: width of head = 1.0:1.36:2.5. Face 2.27 times wider than high. Frons weakly impressed with a deep mid-longitudinal sulcus. Shortest distance between posterior ocelli: transverse diameter of posterior ocellus: shortest distance between posterior ocell-

us and eye = 1.5:1.0:2.75. Length of head behind eye: horizontal length of eye = 1.0:1.82.

Mesosoma approximately 1.47 times longer than high. Mesopleuron largely setose. Scutellar sulcus finely crenulate.

Forewing. Lengths of veins SR1:3-SR:r = 7.7:4.6:1.0. Lengths of veins 2-SR:3-SR:r-m = 1.37:2.8:1.0. Vein 1-SR+M with well-developed spur. Vein cu-a marginally postfurcal. Vein 3-CU1 weakly expanded posteriorly. Vein CU1a with a small anteriorly directed spur near its apex.

Hindwing. Vein 2-SC+R. Apex of vein C+SC+R with one especially thickened bristle. Vein R1 with 3 or 4 proper hamules. Base of wing with a large glabrous area.

Lengths of fore femur: tibia: tarsus = 1.0:1.2:1.1. Lengths of hind femur: tibia: basitarsus = 1.52:2.65:1.0. Hind tibia slender; with a distinct longitudinal lateral groove. Hind basitarsus 9.2 times longer than deep.

Metasoma smooth and shiny. Antero-lateral parts of 2nd tergite and posterior margins of 3rd to 7th tergites membranous. Second tergite 1.3 times wider posteriorly than medially long. Ovipositor approximately 4 times longer than metasoma, 2.5 times longer than forewing.

Brown-orange except for the following which are black: antennae, mesosoma, hind legs, most of metasomal tergites 4-7, ovipositor sheaths. Membranous posterior margins of tergites 3-7 pinkish white. Basal third of wings pale yellowish, apical two thirds smoky; venation largely dark brown but C+SC+R and pterostigma orange.

DESCRIPTION (♂ ♂)

Males are smaller than females; body length 11-13mm.

Virgulibraconoides Quicke (Fig. 4)

A medium-sized genus of medium-sized wasps, which has been previously confused with *Calibracon* (see e.g. Ashmead, 1900), although they are not closely related. Probably the majority of species, all of which appear to be Australian, are undescribed.

Vomeribracon Quicke (Figs 66, 90, 108)

A small genus of medium-sized to large wasps occurring in Australia (north Queensland) and Papua New Guinea. Nothing is known of the biology of the only Australian species, *V. ingres-*

sor (Turner). However, an undescribed species from Papua New Guinea is an important larval parasitoid of the curculionid, *Pantorytes szentivanyi*, which is an important pest of cocoa (G. Holloway, pers. comm.).

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